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Studies

Bank Governance and Financial Stability in CESEE: A Review of the Literature

Sándor Gardó¹

This article explores the interrelationship between bank governance and financial stability in general and in the ten Central, Eastern and Southeastern European EU Member States (CESEE MS) in particular. Agency theory is used to illustrate that banks are engaged in multiple agency relationships. Within a conceptual framework, five main dimensions of bank governance are identified and analyzed, namely internal, external, corporate, institutional and international governance. Based on the pertinent literature, we subsequently review the agency problems the CESEE MS faced in their banking sectors on their way to installing efficient and sound banking systems in the 1990s. Their experience holds important lessons for the completion of banking reform in less advanced transition economies. Most importantly, banking sector restructuring should go hand in hand with a redesign of the incentive structures for all the relevant actors in the system. This seems to be a prerequisite for achieving and maintaining financial stability and improving the efficiency of capital allocation and economic growth prospects. Overall, the CESEE MS experience also provides useful insights for dealing with the ramifications of the current global financial crisis.

JEL classification: G01, G14, G28, G34

Keywords: Governance, financial stability, transition economies

“Since perhaps the only meaningful distinction between man and machine is moral hazard, it may be too much to ask that banking reform eliminate all self-interested ... behavior. However, the mere recognition of the possibility of self-interest ... is a useful start.”²

1 Introduction

Financial intermediaries play a key role in the functioning of market economies, with their mode of operation critically depending on prevalent governance standards and practices. In fact, recurrent episodes of banking sector distress, such as the U.S. savings and loan crisis (1980s), the Nordic banking crisis (in the early 1990s), the Asian crisis (1997) or the Argentine crisis (2001), highlighted the importance of good governance for financial and banking institutions. Governance failures have also been cited as one of the underlying causes of the current global financial crisis. In the same vein, the ten Central, Eastern and Southeastern European EU Member States (CESEE MS)³ were plagued by severe banking sector distress during the first decade of economic transition, i.e. in the 1990s. Poor governance practices were among the root causes.⁴ Phenomena such as “too big to fail,” “bank insolvency,” “nonperforming loan problem,” “bad bank” or “lender of last resort” allow for numerous analogies between the current global financial crisis and the banking crises of the 1990s in the CESEE MS.

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² Boot and Thakor (1993), p. 212.

³ The CESEE MS comprise Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia.

⁴ See e.g. Lindgren, Garcia and Saal (1996), Caprio and Klingebiel (1996), Honohan (1997), Tang, Zoli and Klytchnikova (2000), Enoch, Gulde and Hardy (2002), Bonin and Wachtel (2004) and Gandy et al. (2007).

Governance of nonfinancial firms has been examined widely, both in developed and in developing (including transition) economies.⁵ Yet, research on bank governance in general and in developing and emerging economies in particular has been limited to date even though the topic is highly relevant.⁶ The even smaller body of pertinent research on transition economies focuses on very specific issues, such as the role of banks in the governance of other firms (e.g. Baer and Gray, 1995; Dittus, 1996; Grosfeld, 1997) or the link between banks' ownership structure and bank efficiency (e.g. Weill, 2003; Bonin, Hasan and Wachtel, 2005a).

Against this background, this article is meant to – by way of a structured literature review – shed light on how distortions in banks' governance arrangements were linked to banking fragility in the CESEE MS. The focus is on the 1990s, when most CESEE MS revamped their banking sectors and broadly completed transition-related banking reform. First, drawing on the available literature, we identify all the major dimensions of bank governance. In a second step, the related literature on transition economies is reviewed to show how bank governance practices have developed in the CESEE MS.

The subsequent section 2 addresses the question of why the quality of bank governance matters in general and during economic transition in particular. Section 3 deals with agency theory, which normally underpins the governance debate. By stressing the special nature of banks, section 4 discusses the questions if and why the governance of banks differs from that of nonfinancial firms. Based on Lindgren, Garcia and Saal (1996), section 5 breaks down the various dimensions of bank governance, focusing specifically on transition-related issues. It also sketches a comprehensive “governance nexus”⁷ in transition banking that brings together all major dimensions of bank governance in a unified conceptual framework. Section 6 explores the efficacy of these governance arrangements during transition. Finally, section 7 examines the lessons learned from the experiences of the CESEE MS and presents policy implications for banking reform in less advanced transition economies, where in most cases governance issues have yet to be tackled in a comprehensive manner. This section also discusses in how far the experiences of the CESEE MS provide useful insights for dealing with the ramifications of the current global financial crisis.

2 The Importance of Governance Quality

Governance impacts on financial stability and economic development through various channels (see chart 1).

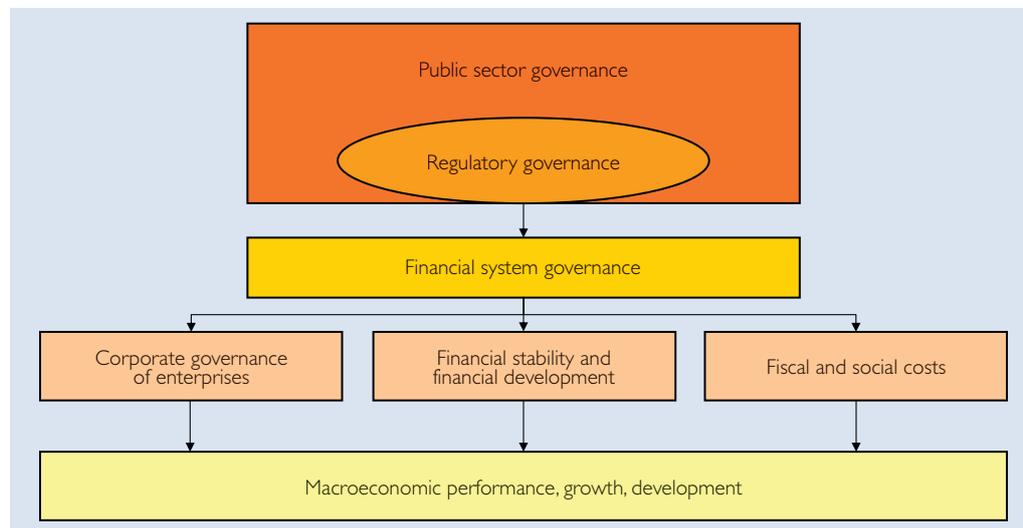
Given their fundamental functions of intermediation and monitoring, banks mitigate information and transaction costs and thus contribute to an efficient allocation and use of resources, thereby promoting economic growth (Levine, 1997). Levine (2004) argues that banks operating along the lines of sound governance

⁵ For research on transition economies, see inter alia Pistor, Reiser and Gelfer (2000), Crotty and Jobome (2004), Berglöf and Claessens (2006), Fox and Heller (2006) as well as Heinrich, Lis and Pleines (2007).

⁶ For general reviews, see Prowse (1997), Caprio and Levine (2002), Macey and O'Hara (2003), Adams and Mehran (2003) and Levine (2004); for details on developing economies, see Arun and Turner (2004), Das and Ghosh (2004), Allen (2005) and Gandy et al. (2007).

⁷ See also Quintyn (2007). For an overview of agency relationships and governance structures, see Gelauff and Broeder (1997).

Governance and Economic Development



Source: Quintyn (2007; slightly adapted).

principles are more likely to allocate capital efficiently and to monitor borrowers properly than banks that are subject to weaker governance practices.

Empirical research both on banks and nonfinancial corporations has shown that governance quality matters for efficiency at both the firm and country level.⁸ De Nicolò, Laeven and Ueda (2006) find that improvements in governance quality result in higher output, investment and productivity growth at the level of the aggregate economy. The benefits are particularly high for industries which rely predominantly on external financing.⁹ On this note, Claessens (2006) stresses easier access to external financing, lower cost of capital and better operational performance as the main channels through which good governance fosters economic growth and development. In addition, Oman (2001) and Meón and Weill (2005) underline the relevance of improved governance structures for constraining the misallocation of scarce resources, particularly in developing economies with low capital stocks. De Nicolò, Laeven and Ueda (2006) also find a significant positive relationship between the degree of financial development and the favorable impact of improved governance on economic development. In particular, financial development and economic growth hinge on the strength of property rights as well as the quality and effectiveness of the legal and regulatory system, two important elements of the corporate environment.¹⁰ These findings are critical for banks, as a better quality of governance in banking is expected to contribute to economic

⁸ For details, see Gompers, Ishii and Metrick (2003), Knack and Keefer (2005), Meón and Weill (2005) and Quintyn (2007).

⁹ This finding seems consistent with the view in the academic literature that debt financing serves as an important corporate governance device by increasing the likelihood of financial distress, reducing free cash flows and fueling creditors' monitoring efforts.

¹⁰ See Levine (1997), La-Porta et al. (1998), Beck, Levine and Loayza (2000), Claessens and Laeven (2003) and Meón and Weill (2005).

growth both directly via higher bank efficiency and indirectly via stepped-up financial development.

The literature on transition economies largely supports these findings.¹¹ Koivu (2004), based on a sample of 25 transition countries, argues that higher banking sector efficiency translates into stronger economic performance. Brissimis, Delis and Papanikolaou (2008) provide evidence that banking reform in the CESEE MS positively influences bank efficiency, while Fries and Taci (2002) argue that reform progress in banking is even a *conditio sine qua non* of banking sector development in transition countries. Pistor (2006) shows that financial market developments in transition economies benefited from improved law on the books as regards shareholder and creditor rights, while highlighting the need for better law enforcement. In a similar vein, De Haas (2002) finds that bank privatization per se does not automatically lead to improved financial sector development and economic growth in transition economies. Rather, it should be accompanied by a sound legal and institutional environment, because without an effective legal system, banks continue to face perverse incentives even when they have been privatized.

Banks moreover play a pivotal role in exercising corporate governance over other firms (see chart 1).¹² This is particularly true for bank-based financial systems, which are the norm in the CESEE MS. Sound governance practices increase banks' screening and disciplining powers, thereby creating incentives for corporations to improve their internal governance arrangements. This in turn enables corporations to obtain easier access to financing and/or lower the cost of capital.¹³ Vice versa, improved governance practices of corporations tend to contribute to better loan portfolio quality, higher profitability, efficiency and stability of the banking sector and stronger economic dynamics.

Poor governance practices in the financial sector contribute to individual or system-wide bank failures and thus entail considerable fiscal (and social) costs. Among others, Tang, Zoli and Klytchnikova (2000) estimate that the total fiscal and quasi-fiscal costs of banking distress (including costs related to the government, central bank and depositor compensation), as cumulated from 1991 to 1998, amounted to some 25% of GDP in the Czech Republic and to 42% of GDP in Bulgaria. Not only does such an additional fiscal burden weigh on public finances for many years, but it also slows the catching-up process by wasting scarce resources and entailing output losses.

Finally, the quality of governance arrangements matters for financial stability. From the financial stability perspective, the "governance view" should be seen as complementary to the quantitative view: The timely identification of governance problems can serve as an early warning system for pinpointing financial vulnerabilities (Chai and Johnston, 2000). Good governance practices underpin the soundness and stability of the financial system by reducing informational asymmetries and increasing the shock-absorbing capacities of the financial system through

¹¹ De Haas (2004) notes some shortcomings in the "legal view," which to some extent limit its applicability on transition economies.

¹² See Macey and O'Hara (2003), Claessens (2006) and Quintyn (2007).

¹³ See e.g. De Nicolò, Laeven and Ueda (2006) and EBRD (2009).

a well-functioning legal, regulatory and supervisory framework.¹⁴ In this regard, banks' predominant role as major source and provider of financial funds in CESEE MS financial markets might entail adverse systemic implications of governance-related bank failures via contagion effects. This could impact the whole financial system, the real economy and the pace of the catching-up process. Yet another factor is the dominant market position that foreign-owned banks hold in the CESEE MS, which is traceable to banking reform and bank privatization strategies in most transition economies. Such cross-border linkages underscore the importance of governance issues that arise from the increasing globalization of banking.

3 The Principal-Agent Problem

Agency theory is frequently used to explore governance issues. The starting point of standard agency theory is the modern (“publicly” owned) corporation characterized by an agency relationship that results from the separation of ownership and control. In such a contractual relationship between two parties, the principal (e.g. owner of a firm) instructs the agent (e.g. manager of a firm) to conduct certain transactions on his behalf.¹⁵ Agency relationships are, however, not necessarily problem-free and the parties involved may well encounter conflicts. The principal delegates not only multiple tasks to the agent, but also certain discretion in decision making. This in turn raises the question to what extent the agent – against the background of information asymmetries – acts in the principal’s interest or engages in moral hazard.¹⁶

The challenge is thus to find the most efficient governance mechanisms, which decrease the likelihood of agents’ self-interested behavior and reduce the uncertainty resulting from informational asymmetries between principal and agent, thereby aligning the interests of the two counterparties involved. In this sense, the ultimate objective of agency theory is to minimize the agency costs. They are the sum of (1) the expenses taken on by the principal (incentive, monitoring and enforcement costs), (2) the agent’s costs in signaling that he or she acts in the principal’s interest (“bonding expenditures”), and (3) a residual loss capturing the remaining difference between the actual outcome of the agent’s decisions and the desired outcome maximizing the principal’s welfare.¹⁷

Depending on whether governance mechanisms are designed to protect only shareholders’ interests or also those of stakeholders,¹⁸ two strings of literature have emerged. The Anglo-Saxon (outsider) model, which rests on a mainly market-based financial system, holds that governance should first and foremost aim at maximizing shareholder value. By contrast, the European (insider) model, which is based on bank-dominated financial markets, states that the firm is a “complex web or nexus of contractual relationships” (Macey and O’Hara, 2003), giving sim-

¹⁴ See Chai and Johnston (2000), Halme (2000), Das, Quintyn and Chenard (2004) and Heremans (2007).

¹⁵ See Jensen and Meckling (1976), Fama (1980) and Fama and Jensen (1983).

¹⁶ See Arrow (1985), Pratt and Zeckhauser (1985) and Shleifer and Vishny (1997). According to Tirole (1999), moral hazard can take the form of insufficient effort, excessive risk taking, managerial entrenchment and/or self-dealing.

¹⁷ See Jensen and Meckling (1976), Pratt and Zeckhauser (1985) as well as Eisenhardt (1989).

¹⁸ The term “stakeholder” refers to individuals, groups or institutions (e.g. shareholders, creditors, customers, employees and suppliers) that are directly or indirectly attached to and affected by the actions and objectives of a corporation.

ilar weight to the interests of stake- and shareholders. While the first concept focuses on “firm level” governance, i.e. corporate behavior, the second also accounts for the corporate environment, i.e. the normative business framework.¹⁹ These two models are in fact to a large degree interrelated, as the quality of firm level governance largely depends on the quality of the business environment, i.e. the political, institutional and legislative framework, and vice versa.²⁰

Governance practices address multiple agency problems mainly with a view to bridging the gap between the different interests of various share- and stakeholders. Governance can thus be understood as a complex system of control and incentive mechanisms, which (1) enhances corporate efficiency by helping an enterprise effectively manage scarce resources and (2) aligns corporate behavior with stakeholders’ (more broadly speaking, society’s) interests by mitigating the misallocation of existing resources.²¹ The existence and quality of governance arrangements determine market participants’ “net risk taking behavior” (Chai and Johnston, 2000). Enforcement by the private and the public sector plays a key role in this context, in particular, when we also take into account potential resistance by various interest groups to applying and improving available governance mechanisms.²²

4 The Specifics of Bank Governance

Initially, researchers of bank governance mainly argued along the lines of standard agency theory and treated banks in the same way as nonfinancial corporations. More recently, however, research on bank governance has started to stress banks’ uniqueness and their special functions and features: their special capital structure, specific nature of activities and degree of regulation.²³

Standard agency theory focuses on the owner-manager relationship in firms, where owners provide (nearly) all of the firm’s capital (equity finance). Banks, however, operate predominantly on a (strongly dispersed) debt basis and are highly leveraged (Macey and O’Hara, 2003). This differentiation between debt and equity finance is not only important because, in the case of bank insolvency, debt holders (all put together) have much more at stake than equity holders, but also because under such circumstances risks and control rights are transferred from the equity to the debt holders.²⁴

Moreover, the literature tends to argue that banks are more “opaque” than nonfinancial firms given the intertemporal divergence of effort and reward, the special nature and growing complexity of bank products (Heremans, 2007; Llewellyn, 2007) and the limited observability of loan quality. In fact, as the current financial crisis has patently proven, banks can often mask emerging problems for a longer period of time than nonfinancial firms.²⁵ First, this lower degree of trans-

¹⁹ See Shleifer and Vishny (1997), Berglöf and Thadden (1999), Macey and O’Hara (2003) as well as Claessens (2006). Micro- and macro-governance concepts are also common in the literature, with the former mostly referring to ownership and board issues, while the latter refer to legal and regulatory standards, creditor rights, enforcement and other stakeholder issues (Crotty and Jobome, 2004; Ciancanelli and Reyes-Gonzales, 2000).

²⁰ See Oman (2001), Arun and Turner (2004), Claessens (2004) and Quintyn (2007).

²¹ See Tirole (1999), Allen (2005) and Claessens (2006).

²² See Oman (2001), Berglöf and Claessens (2006) as well as Claessens (2006).

²³ See Ciancanelli and Reyes-Gonzales (2000), Adams and Mehran (2003) as well as Llewellyn (2007).

²⁴ See Shleifer and Vishny (1997), Tirole (2001) and Heremans (2007).

²⁵ See Fink and Haiss (1999), Caprio and Levine (2002), Levine (2004) as well as Király, Mérió and Száz (2007).

parency²⁶ can aggravate the agency problem by providing managers and/or block holders (large shareholders) with more room for opportunistic behavior. Second, it can also make it more difficult for dispersed equity and debt holders to control managers and/or block holders, in particular when we also consider their ability (lack of expertise) and willingness (associated pecuniary and/or nonpecuniary costs, free rider problem) to do so.²⁷ Several disciplining mechanisms can mitigate these agency problems, even though they may not always be very effective (Levine, 1997; Allen and Gale, 1999). They include competition in the product market, the market for corporate control (e.g. takeovers), the managerial labor market as well as other (internal) mechanisms like ownership and board structures or incentive-compatible remuneration.²⁸

Finally, standard agency theory is based on the assumption of perfect and competitive markets. By contrast, banks (given their opacity and economic importance) are highly regulated. This not only reduces competitive pressures, but also weakens the efficacy of the above-mentioned market forces as governance mechanisms.²⁹ Safety nets, such as (explicit or implicit) deposit insurance schemes or central banks' lender of last resort function, have been put in place to deal with systemic risk concerns. These safety nets are designed to protect depositors in case of bank failures to avoid bank runs and possible contagion effects and thus to ensure the stability of the financial system. On the flip side, such arrangements can, however, create new incentives to moral hazard, either via curbing monitoring efforts (by depositors) or triggering excessive risk taking (by managers). This in turn leads to further regulation, e.g. on capital requirements, asset diversification, ownership structure or competition.³⁰

Given these specific features, the governance of banks is not only different from that of nonfinancial firms, but it is also more complex. Hence, for banks, there is a clear case to take a broader view of governance. Some research has already been conducted that – in line with the tenets of the continental European model of corporate governance – takes into account depositors and/or borrowers and/or regulators and supervisors.³¹

5 Dimensions of Bank Governance

In light of banks' above-mentioned special features and functions, standard agency theory does not lend itself fully to examining bank governance. To get a grasp of the agency problems faced by banks during economic transition, taking a multidimensional view of bank governance seems to be more appropriate.

²⁶ Transparency is an essential element of good governance. However, there are certain limitations to it in banking given competition issues and (regulatory) confidentiality requirements (Sauerzopf, 2008). Moreover, relevant information is revealed mostly only to authorities, but not to the market (Leechor, 1999), which contributes to the persistence of informational asymmetries.

²⁷ See Mishkin (1997), Caprio and Levine (2002), Das and Ghosh (2004) as well as Berglöf and Claessens (2006).

²⁸ See Prowse (1997), Allen and Gale (1999), Tirole (2001), Levine (2004), Adams and Mehran (2003) as well as Llewellyn (2007).

²⁹ See Ciancanelli and Reyes-Gonzales (2000), Caprio and Levine (2002), Levine (2004) as well as Allen (2005).

³⁰ See Leechor (1999), Macey and O'Hara (2003), Das and Ghosh (2004), Levine (2004) as well as Heremans (2007).

³¹ On different governance concepts for banks, see Harm (2002), Adams and Mehran (2003), Macey and O'Hara (2003), Arun and Turner (2004), Quintyn (2007) and Lindgren, Garcia and Saal (1996).

Governance problems in banking, namely incentives to moral hazard, are largely affected by the environment under which financial market actors operate (Lindgren, Garcia and Saal, 1996; Fries, Neven and Seabright, 2002). The regime change from a centrally planned to a market economy is accompanied by a wide array of “external” uncertainty. This encompasses macroeconomic and political instability, institutional, legislative and judicial loopholes and bottlenecks as well as the “governance gap” (Chai and Johnston, 2000) created by financial liberalization, decentralization and deregulation.³²

In such a setting, incentives are particularly distorted and behavior is governed by factors other than market forces, which leads to “internal” uncertainty. To capture these features, it makes sense to take a broad view of bank governance. In other words, akin to the stakeholder approach outlined above, one should include all actors involved, namely depositors, borrowers, regulators and supervisors, and their agency relationships with banks.

A simplified bank balance sheet is a good starting point for identifying the most relevant agency relationships and governance issues banks face during transition (chart 2). On the liability side, two main agency problems emerge: (1) between bank owners and managers, as implied by traditional agency theory (internal governance), and (2) between the bank and its creditors (mainly depositors) and/or bank supervisors (usually central banks) in their capacity as guardian of both the depositors’ and the general public’s interests (external governance). The existing literature views bank governance mainly from the liability side and thus deals with the issues of internal and external governance.

However, the asset side of banks’ balance sheets involves another dimension of the agency problem, namely that between the bank and its debtors (mainly corporations) (corporate governance). Again, this is crucial given banks’ prominent role in the governance of other firms and the mutually reinforcing character of the qualities of governance arrangements in the financial and corporate sectors.

Moreover, two additional important dimensions come into play. Banks do not operate in a vacuum, but have relationships with multiple stakeholders who not only shape banks’ business environment, but also influence the decision-making process within banks (institutional governance). Such stakeholders include political groupings, central banks, privatization agencies or competitors, and more recently also other institutional entities, such as mutual/pension/hedge/sovereign wealth funds and private equity firms.³³ The list could be extended to include auditors and rating agencies. Especially the latter’s disciplining role is, however, limited given the prevalent conflict of interest between their role as (independent) external monitoring devices and (financially dependent) bank consultants.³⁴

Finally, financial globalization requires banks to adopt and adhere to international legal and regulatory standards. They represent both a framework for the operation of financial institutions in an international context and the highest level

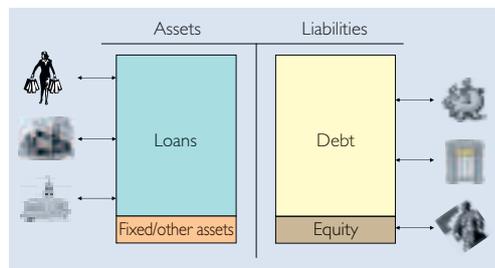
³² Crotty and Jobome (2004) find that governance problems in transition economies are a function of the design of regime change, i.e. the pace and sequencing of reform measures. On this note, the “shock therapy” is regarded as inferior to the “gradual approach.”

³³ For further details on the governance role of private equity firms, see Boot and Thakor (2009). For possible interdependencies and interactions between multiple stakeholders, see Balling’s (1998) governance matrix.

³⁴ See e.g. Leechor (1999) and Boot and Thakor (2009).

Chart 2

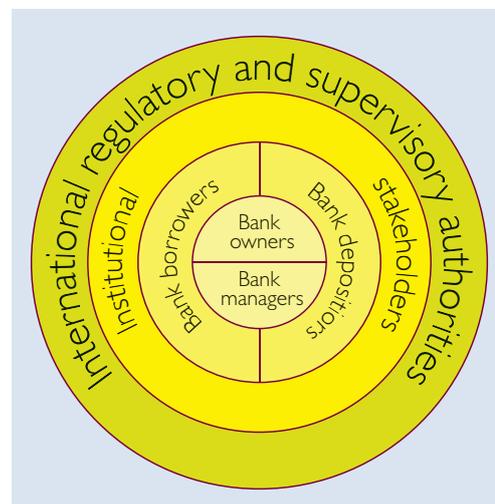
Bank Governance: A Balance Sheet Approach



Source: Compiled by author.

Chart 3

The Bank Governance Nexus



Source: Compiled by author.

of “monitoring” of their activities (international governance). On the one hand, financial globalization has had positive effects on competition, corporate governance and the availability and cost of funding. On the other hand, international financial integration has increased the complexity of the banking business, informational asymmetries and systemic risk at both the European and the global level, while at the same time challenging bank supervisors’ monitoring efforts.³⁵ Again, this is crucial for the CESEE MS, as their banking systems were largely sold to internationally active foreign banks.

When we put all of these five governance dimensions together, a complex nexus of internal, external, corporate, institutional and international governance emerges. This framework helps understand and assess banking sector developments during transition toward a market-based financial system (chart 3).

6 Bank Governance in Transition: What Went Wrong (or Right)?

In transition economies in particular, the design and efficiency of governance arrangements matter for at least three reasons:³⁶ (1) Banks play a crucial role in economic development, i.e. the catching-up process of transition economies, (2) banks are the major source and provider of financial funds in the CESEE MS and thus largely determine the efficiency of aggregate capital allocation, and (3) the regime change after the fall of the Iron Curtain in 1989 made far-reaching banking reforms and the introduction of market-based banking structures necessary. At least during early transition, such a general overhaul, including financial liberalization, implied a lack of strong governance mechanisms and thus more leeway for bank owners’ and managers’ self-interested behavior.

How has bank governance therefore developed in transition economies? To explore this issue in more detail, we look at each of the five governance dimensions and provide a synopsis of the evidence reported in the literature.

³⁵ See e.g. Lindgren, Garcia and Saal (1996), Schüler (2003) and Alexander and Dhumale (2006).

³⁶ For general considerations on developing and transition economies, see Levine (2004), Arun and Turner (2004), Das and Ghosh (2004) as well as EBRD (2009).

6.1 Internal Governance

As set out in section 3, internal governance problems mirror conflicts of interest resulting from the separation of ownership and control. Aligning owners' and managers' diverging goals and interests requires well-functioning internal and market mechanisms of control.

In the CESEE MS, the question arose of how to contain in a new and transforming environment the resurfacing problems of insider control in the absence of traditional control mechanisms.³⁷ This was particularly relevant, as important control devices like the disciplining role of market forces mentioned above did not deter managers from moral hazard for several reasons.

First of all, at the early stage of transition, human capital in banking and management know-how were scarce, with (nonindependent) bureaucrats and government officials with poor banking expertise filling many senior management positions.³⁸ Combined with rather limited competition in the managerial labor market, this meant that the labor market was all but nonexistent as a control mechanism. Later on, when foreign banks entered the region (and foreign managers took posts in the newly acquired or established subsidiaries), management know-how in banking was gradually upgraded in the CESEE MS.

Second, capital markets were underdeveloped (both in terms of depth and structure), while the information required for company evaluation was distorted given high macroeconomic uncertainties, inadequate disclosure and lax accounting practices. At the same time, infant capital market structures coupled with regulatory impediments and widespread state ownership undermined the credibility of potential takeover threats. This corresponds with Revoltella's (1998) observation that capital markets in the CESEE MS were initially seen as instruments for ownership change (privatization) rather than as a traditional source of finance and a governance device.

Finally, given oligopolistic market structures, as reflected by high market and (state) ownership concentration, competition in the market for final bank products was low.³⁹ In fact, this noncompetitive nature of the banking business, combined with a lack of transparency and infant capital market structures, also undermined the role of market discipline as a governance device during most of the first decade of transition.

The more market mechanisms fail to ensure prudent behavior by managers, the more owners depend on internal control mechanisms (e.g. the board of directors) and incentive schemes (e.g. incentive-compatible remuneration). Board efficiency primarily depends on board size, independence and composition, but also on the underlying know-how. However, control expertise in bank boards was a rather scarce good in the CESEE MS especially in the early stages of transition. In light of strong personal links among managers (originating from central planning times), "cross-control" structures were not uncommon.

Also, high external uncertainty put the efficacy of incentive schemes and sanction mechanisms (such as firing incumbent management) into question. Owners

³⁷ For further details, see Revoltella (1998), Lewis (2002) as well as Fox and Heller (2006).

³⁸ See Király, Mészáros and Szász (2007), Enoch, Gulde and Hardy (2002) as well as Gandy et al. (2007).

³⁹ According to Levine (2004), product market competition is in general less pronounced in banking than in other sectors, since long-term relationships with clients represent barriers to competition.

were hardly in a position to verify whether good (or bad) performance was a result of managerial effort (or slack) or simply a consequence of improving (or deteriorating) external conditions (Grosfeld, 1997). Jones and Kato (1998) are among the very few to investigate the determinants of managerial compensation in transition economies. They use data from Bulgaria and find a strong relationship between pay and firm size but none between pay and profitability. This implies that executive compensation schemes were designed to provide managers with incentives to increase size (or resist downsizing) and to pay less attention to profitability. The magnitude of the too big to fail and the bad debt problems in banking during early transition suggests that these findings might well apply to banks, too. In another study on the Czech Republic and Slovakia, Eriksson (2005) confirms a strong firm size effect in executive compensation. Yet, he also finds first evidence of a positive influence of corporate performance on managerial pay in the Czech Republic, which implies rather strong managerial incentives to increase corporate profitability.

As to banks' ownership structure, internal governance problems in the CESEE MS were aggravated by dominant state ownership. From a theoretical point of view, a concentrated ownership structure lends itself to mitigating governance problems.⁴⁰ However, state ownership also has some drawbacks, which can, but do not necessarily have to, hamper governance quality. State banks do not operate solely on commercial terms, as their operations are often tilted toward achieving economic and political objectives. This results in a conflict of interest between the state's capacities as bank owner and guardian of public interest.⁴¹ State ownership might therefore distort competition and managerial incentives, and restrain corporate innovation. It is thus associated with a higher degree of inefficiency, misallocation of scarce resources (given the interference into the day-to-day management of banks and widespread related/directed lending) and slower financial development and economic growth.⁴² Moreover, the state often lacks credible disciplining mechanisms, because in the event of financial distress, it rather tends to soften budget constraints and to take a "too political to fail" stance. As a result, bank managers' weak performance fairly often remains without consequences. Finally, monitoring mechanisms such as the market for corporate control or monitoring through the final principals (taxpayers) are likewise absent.⁴³

For emerging economies, Gandy et al. (2007) pinpoint the ownership issue as the "primum mobile" of the quality of bank governance. Most of the empirical literature on transition economies finds that the type of ownership is also relevant for bank efficiency.⁴⁴ Private ownership is found to be superior to state ownership,

⁴⁰ *The agency problems related to concentrated ownership, i.e. the expropriation of minority shareholders by controlling owners should, however, not be neglected. For more details, see e.g. Shleifer and Vishny (1997) and Levine (2004).*

⁴¹ *See Caprio and Levine (2002), Nollen, Kudrna and Pazdernik (2005) as well as Quintyn (2007).*

⁴² *See Saal (1996), Meagher (2002), Ferri (2003), Crotty and Jobome (2004), Levine (2004), Andrews (2005) and Haselmann, Marsch and Weder di Mauro (2009).*

⁴³ *See Lindgren, Garcia and Saal (1996). According to Király, Mérő and Száz (2007), diverse state (i.e. government, public agencies, state enterprises) ownership might pose an obstacle to proper governance of banks. However, according to Ferri (2003), a plurality of public sector shareholders, in light of the different interests represented, might offer some degree of shelter from capture of state banks by large (state-owned) firms.*

⁴⁴ *For further details, see Meón and Weill (2005).*

even though differences prevail between various forms of private ownership. Majority domestically-owned banks are considered to be least efficient (Fries and Taci, 2005). However, the issue of state and private ownership is more complex. In an empirical study based on a sample of 11 transition countries, Bonin, Hasan and Wachtel (2005a) find that denationalization is not a sufficient precondition for higher bank efficiency. This is consistent with the observation that domestic private strategic owners in transition economies were often linked to certain industries or politics. Also, there have been cases when banks were founded by corporations to achieve better access to (cheap) financing of other business interests. Coupled with opaque cross-ownership structures, in many instances this entailed a high level of related party influence, in particular during early transition.⁴⁵

Overall, the view is well established in the literature that the design of ownership change and the resulting ownership structure are relevant for governance quality and consequently bank efficiency. But according to Bonin, Hasan and Wachtel (2005b), the timing of privatization seems to be of utmost importance as well, with earlier-privatized banks being more efficient than later-privatized ones, which suggests that the realization of efficiency gains is time dependent.

As to the methods of ownership change, Meagher (2002) and Andrews (2005) point out that bank privatization via initial public offerings (e.g. in Poland) and voucher privatization (e.g. in the Czech Republic) led to dispersed ownership structures, which – apart from neither generating revenues for the government (in case of voucher privatization) nor providing fresh capital for the privatized bank – often reinforced insider control and preserved prevalent incentive problems. Similarly, Bonin, Hasan and Wachtel (2005b) argue that voucher privatization does not result in increased efficiency given continued state interference in voucher-privatized banks.

In contrast, foreign bank entry is widely seen to be beneficial for improving bank governance and efficiency in transition economies,⁴⁶ with the most efficient institutions being foreign greenfield banks (Bonin, Hasan and Wachtel, 2005b). As for banks with foreign participation, a higher foreign stake is associated with less inefficiency (Hasan and Marton, 2003).

After initial strong resistance to foreign ownership, more and more CESEE MS allowed foreign banks to enter the market toward the latter part of the 1990s, mainly in view of increasing fiscal and external financing constraints. Foreign presence contributes to ownership diversification (not only by complementing state and domestic private ownership, but also owing to foreign investor plurality), to enhanced competition, product innovation, improved risk management practices, better governance of banks as well as a more advanced human and technological capital base. All of this promotes bank efficiency and, ultimately, banking system stability.⁴⁷ Given the “import” of foreign regulatory and supervisory practices and a loosening of political ties, which implies a lower probability of regulatory and political capture, foreign bank entry also speeds up regulatory reform (Meagher, 2002).

⁴⁵ See Meagher (2002), Nollen, Kudrna and Pazdernik (2005), Király, Mérő and Száz (2007) as well as Gandy *et al.* (2007).

⁴⁶ See e.g. Weill (2003), Hasan and Marton (2003) as well as Bonin, Hasan and Wachtel (2005a).

⁴⁷ See Ferri (2003), Weill (2003) as well as Arun and Turner (2004).

6.2 External Governance

External governance problems are based on informational asymmetries arising between banks and their debt holders, in particular depositors. They are closely related to the problems of internal and corporate governance. Bank managers' opportunistic behavior toward bank owners, and both parties' inability and/or unwillingness to enforce hard budget constraints in the corporate sector are already an indication for banks' moral hazard behavior vis-à-vis their depositors. Who then should monitor banks' behavior?⁴⁸ Obviously, depositors should play a critical role in monitoring. However, as pointed out before, the individual depositor is neither able (due to lack of knowledge, prohibitive costs) nor willing (free rider problem) to supervise the bank he deposited his money with. This is one of the factors behind the rationale for the prudential regulation and supervision of banks.

The efficiency of bank regulation and supervision largely depends on the availability and quality of laws and regulations, and on the degree of enforcement. It is widely accepted that ill-designed laws and regulations, by offering discretionary room for maneuver, aggravate agency problems in banks (Quintyn, 2007). Thus, it is of crucial importance that banking reform is supported by proper laws and regulations. Nevertheless, evidence in the CESEE MS shows that regulations designed to prevent banks from governance failures (e.g. capital requirements, licensing, asset diversification, deposit insurance) were among the first to give rise to moral hazard (Király, Mériő and Száz, 2007).

Capital requirements are a case in point. They play a vital role in preventing owners and managers from excessive risk taking, so that the amount of capital at stake determines owners' incentives to exercise management control and shape managerial behavior (Halme, 2000). During early transition, capital requirements had been low and were increased only gradually to the level of international best practice. Inadequate capitalization, however, increased the likelihood of soft budget constraints and banks' incentive to gamble for resurrection.⁴⁹

Bank recapitalization might help overcome such incentive problems. However, in order to be successful, capital injections have to be conditional, well defined (e.g. differentiating between old and new bad debt), appropriate (in terms of volume) and credible especially with a view to their frequency, so as to imply a "once and for all" solution. Only under such conditions is it possible to break the "vicious cycle of repeated recapitalizations" (Andrews, 2005), which was common in some transition economies (e.g. in Hungary).⁵⁰

Apart from initially low minimum capital requirements, highly liberal bank licensing during the early 1990s – to spur competition in the banking sector – and inappropriate asset diversification rules in many instances seem to have contributed to increasing the moral hazard problem in banks.⁵¹

In order to cope with these legal deficiencies and to close moral hazard loopholes, banking laws were gradually upgraded to best practice. Sound laws and regulations are, however, fruitless without enforcement (Berglöf and Claessens, 2006).

⁴⁸ For further details, see e.g. Diamond (1984) and Holmstrom and Tirole (1997).

⁴⁹ See Dittus (1994), Berglöf and Roland (1995) and Fries, Neven and Seabright (2002).

⁵⁰ See Berglöf and Roland (1995), Saal (1996), Meagher (2002), Bonin and Wachtel (2004) as well as Király, Mériő and Száz (2007).

⁵¹ See e.g. Reiningher, Schardax and Summer (2002) and Bruckbauer, Gardó and Perrin (2004 and 2005).

In fact, enforcement posed a great challenge to authorities in the CESEE MS in the early stage of transition. Because of transitional circumstances (e.g. missing legal authorization, lack of information, inadequate staff qualifications, staff shortages, wage competition from the private sector) supervisory authorities were often not able to appropriately fulfill their duties (Fink et al., 1999). Moreover, supervisors themselves often operated under perverse incentives and acted in their own interest (e.g. reputation, financial interests, power) or the interest of large stakeholders, such as the state, various interest groups or supervised institutions (“regulatory capture”),⁵² thereby undermining the credibility of the supervisory process. The related “regulatory forbearance” – particularly in the case of state-owned banks – may represent an obstacle to effective bank governance.⁵³

Moreover, in response to recurring banking (sector) crises, authorities in the CESEE MS at an early stage aimed at creating relevant safety nets to regain confidence and foster banking system stability. Before, costly implicit guarantees (primarily for state banks) had been common, which distorted competition and increased moral hazard on both banks’ and depositors’ part (Tang, Zoli and Klytchnikova, 2000). Against this background, creating a credible explicit deposit insurance system was seen as vital, with the timing of establishment and the design of the scheme (premiums, coverage, level) being particularly important for determining risk-taking behavior and the quality of bank governance. Getting things right was challenging in transition economies, as the moral hazard problems related to deposit insurance were pressing during transition, given a higher degree of informational asymmetries and the bad debt problem (Hermes and Lensink, 2000). As to the design of deposit insurance schemes, Nenovsky and Dimitrova (2008) argue that in the CESEE MS overinsurance (largely a consequence of harmonization with EU standards), weak coinsurance practices and the limited use of risk-adjusted premiums increased the risk of moral hazard.

6.3 Corporate Governance

Corporate governance, or the monitoring of borrowers, is – apart from mobilizing and allocating funds – the third main function of banks (Diamond, 1984). The elimination of moral hazard on the part of debtors requires not only information, but also sanction mechanisms whenever scarce funds are used inefficiently. If none of this is available easily and at nonprohibitive costs, bank owners’ and managers’ incentives might change. Thus, the quality of banks’ internal governance not only depends on the strength of available corporate governance arrangements, but to a large extent also on banks’ ability and willingness to fulfill their corporate governance functions.

In the early phase of transition, both banks’ ability to gather information on clients and the use of sanction mechanisms were subject to limitations. First, an important consequence of the regime change was that banks lost proprietary information. Information on clients accumulated over decades of central planning became useless overnight in a rapidly changing environment. On the other hand, acquiring reliable (future-oriented) information was impaired by high macroeconomic uncertainty, missing credit registries, inadequate disclosure practices, lax

⁵² For a general overview on regulatory capture in banking, see Hardy (2006).

⁵³ See Leechor (1999), Halme (2000) and Andrews (2005).

and “creative accounting standards” (Király, Mérő and Száz, 2007; Enoch, Gulde and Hardy, 2002) and unclear and fluid ownership structures in the corporate sector (Meagher, 2002). Moreover, reputation could not act as a source of information or governance device. Existing firms had a rather poor reputation and newly-founded enterprises none at all, and reputation building was difficult given the surrounding uncertainty.⁵⁴

Second, the credibility of sanction mechanisms, such as the use of collateral⁵⁵ or the initiation of bankruptcy proceedings, was often affected by unsettled creditor rights, inappropriate legal frameworks and ineffective debt collection procedures (Baer and Gray, 1995; Hainz, 2003).

Finally, in order to properly execute their corporate governance functions, banks would have required adequate risk management systems, which were another scarce good in the early stages of transition (Meagher, 2002). Apt risk management in banks is a prerequisite for good governance (in both enterprises and banks) and has to comprise both proper risk assessment and effective risk monitoring. But the reverse causality appears to hold, too, with good corporate governance mechanisms contributing to better risk management.

From the bank governance perspective, it is, however, more important to note that the lack of ability was also accompanied by a lack of willingness. In fact, it is widely argued that during early transition banks often had no interest in hardening budget constraints in the corporate sector.⁵⁶ First, high costs and lengthy procedures frequently made creditor rights enforcement unattractive. Second, banks hoped that future macroeconomic conditions would be more favorable and help borrowers to recover (wait and see attitude). Third, through inactivity and passivity, banks fearing a run or immediate action by supervisory bodies also tried to conceal their own financial distress.⁵⁷ Fourth, in the case of multiple creditors, the problem of free riding prevailed. Fifth, the lack of alternative high-quality projects and the “too many to fail” problem (Berglöf and Roland, 1998) induced banks to continue lending to established and troubled borrowers. This in turn deterred firms from initiating restructuring measures despite pressing adjustment needs (Berglöf and Thadden, 1999). Finally, in order to increase the probability of a government bailout, banks were also prone to soft budget constraints. Thus, banks’ failure to exert proper corporate governance of firms is not only the outcome of, but also the reason for a lack of good governance in the corporate sector. On this note, Berglöf and Roland (1995, 1998) find that the likelihood of soft budget constraints (and bank bailouts) is negatively correlated with loan quality, collateral availability and the level of bank capitalization.

⁵⁴ See Baer and Gray (1995), Berglöf and Claessens (2006) as well as Fox and Heller (2006).

⁵⁵ According to Baer and Gray (1995) and Hainz (2003), problems related to collateral during transition include unclear property rights, a narrow definition of property qualifying as collateral, multiple use of collateral, over-collateralization, an unfavorable hierarchy of liens and a low marketability of collateral. In this context, Weill and Godlewski (2009) find no empirical support for banks using collateral to mitigate *ex ante* informational asymmetries (adverse selection) in transition economies. This suggests that other considerations, *i.e.* minimizing loan losses and/or reducing *ex post* information asymmetries (moral hazard), play a more important role for collateral use.

⁵⁶ See *e.g.* Mitchell (1992), Begg and Portes (1993), Saunders and Sommariva (1993), Saal (1996) and Dittus (1996).

⁵⁷ For a case study on the Czech Republic, see Hanousek and Roland (2002).

As transition proceeded, it became ever more evident that without an adequate legal and regulatory framework for claim enforcement and proper incentive structures, monitoring efforts would not be successful and misallocation of capital would continue. The soft budget constraints prevalent in the banking and enterprise sectors, a distorted debt repayment culture as well as weaknesses in transparency, enforcement and risk management led to the accumulation of a huge burden of nonperforming loans (both inherited and newly originated). This in turn affected the conduct of management (Meagher, 2002; Enoch, Gulde and Hardy, 2002), which often resulted in “lemming behavior” by banks and a high degree of short-termism in banks’ business strategies (Fink and Haiss, 1999).

The incentive-distorting bad loan problem requires first and foremost that the magnitude of the underlying problem is ascertained. This is a challenging task given bank managers’ interest to stay in office and their ability to easily mask emerging problems (Fink and Haiss, 1998). Aghion, Bolton and Fries (1996) argue that transition banks’ incentive to reveal the true dimension of their bad loan problem largely depends on the rigor of the government. If the authorities are tough (if managers are fired, insolvent banks are shut down, etc.), banks will tend to underreport bad loans (and thereby contribute to a softening of the budget constraints in the corporate sector). On the other hand, if they are too soft (insolvent banks are fully bailed out and managers remain unpunished), banks will be inclined to overstate their problems. Aghion, Bolton and Fries (1996) also argue that the optimal amount of information will be revealed in a soft approach (reducing banks’ incentives to conceal bad loans) in combination with the transfer of bad loans at an adequate price (i.e. less than the minimum value of a performing loan) to a hospital bank (reducing banks’ incentive to overstate bad loans).

In order to be able to take appropriate measures to clean up bank balance sheets, it is also crucial to understand the link between managerial performance and bad loans. In this respect, empirical evidence is mixed. For example Rossi, Schwaiger and Winkler (2005), based on a sample of 278 banks in nine CESEE MS economies for the years 1995 to 2002, find evidence for the bad luck hypothesis: A high volume of bad loans and a low level of bank efficiency are the result of external factors outside management control. However, Podpiera and Weill (2008), based on data for Czech banks covering the period from 1994 to 2005, report empirical support for the bad management hypothesis: Low efficiency and a high level of bad loans are a sign of poor management performance.

Once the issue of management responsibility is addressed, attention has to be paid to the design of an incentive-compatible strategy for the workout of bad loans. In this context, debt cancellations and debt-equity swaps can send wrong signals toward managers (Meagher, 2002) and may even increase the risk of management misbehavior. In addition, banks – aware of the high skill- and cost-intensity of an active shareholder role and the related moral obligation to extend financing in times of trouble – may not even be interested in exercising corporate governance via debt-equity swaps (Dittus, 1996).

The literature also differentiates between state-led (often taking the form of a “bad bank”) and bank-led workouts. The former is centralized (and was taken e.g. in Hungary, the Czech Republic and Slovakia), while the latter is decentralized (e.g. in Poland), depending on who is responsible for dealing with the bad debt problem. Both strategies have pros and cons. In particular, the centralized ap-

proach is seen to provoke the problem of moral hazard, while the decentralized approach is viewed to prolong ties to bad customers and thus to delay the recovery of banks (Bonin and Wachtel, 2004). Hence, a mixed strategy is often regarded as the best solution. In fact, Berglöf and Roland (1995) state that, depending on the loan portfolio quality, a partial transfer of nonperforming loans to a “bad bank” is preferable to a full transfer, which would release banks from their responsibility to participate in the costs of the balance sheet cleanup. In any case, the repair of banks’ balance sheets has to go hand in hand with the restructuring of the corporate sector, preferably with some bank involvement, in order to account not only for the stock (inherited bad loans), but also the flow problem (newly generated bad loans).⁵⁸

6.4 Institutional Governance

Sound institutions are vital for bank governance. In fact, institutional stakeholders – comprising public organizations responsible for legislation and law enforcement, and private (non- or for-profit) entities actively shaping banks’ business environment – with all their multiple interests exert substantial influence on financial markets and institutions. They therefore to a large extent determine the timing and intensity of banking reform (Fink et al., 1999).

Most CESEE MS inherited weak institutional and legal systems, which made institution building a cornerstone of transition (Bonin and Wachtel, 2004). Thus, functional and credible institutional arrangements, both formal and informal, were crucial for hardening budget constraints in transition economies (De Haas, 2001). Reininger, Schardax and Summer (2002) as well as Berglöf and Pajuste (2005) found that the CESEE MS – encouraged by the need to adopt the *acquis communautaire* in the course of EU membership negotiations – have in little more than a decade made good progress in bringing their institutional and legal systems closer to Western standards (see chart 4 based on World Bank governance indicators).⁵⁹ However, they still spotted room for improvement mainly as regards the effectiveness of laws (i.e. implementation and enforcement).

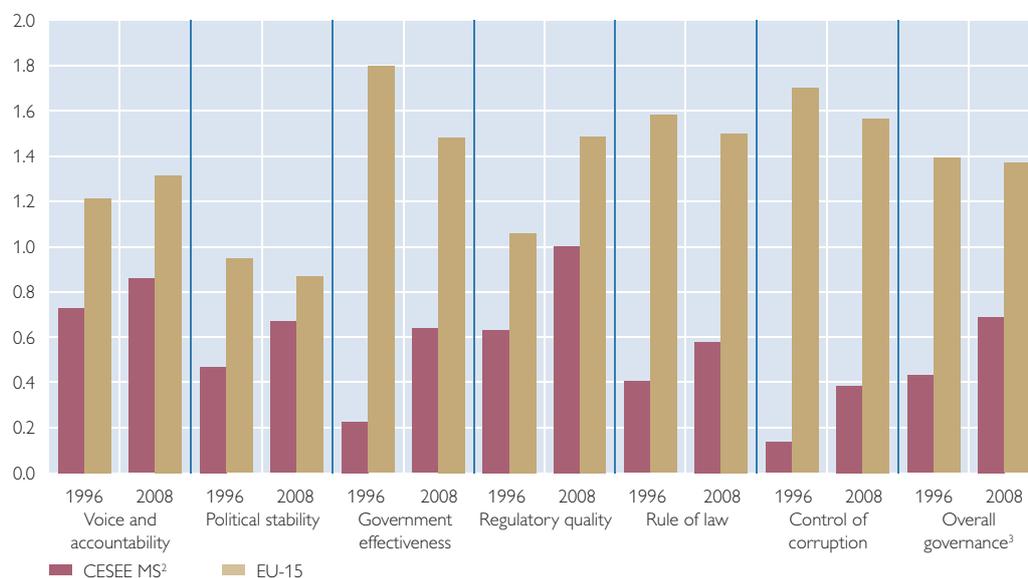
However, in a weak environment not only bank owners and managers, but also institutional stakeholders might be inclined to make use of their bargaining power to influence the decision-making process in banks, in order to secure some “control and cash-flow rights” (Claessens, 2006). A stakeholder’s bargaining power is thereby a function of his standing and legitimation (legitimate power), special expertise (expert power) or ability to reward conformity (reward power) and to penalize nonconformity (coercive power) (Fink and Haiss, 1999).

In fact, these agency relationships between banks and institutional stakeholders proved to be an obstacle to banking sector reform in the CESEE MS in the earlier stages of transition. There are two reasons for this: First, the general economic and political turmoil accompanying the transition process presumably also amplified institutional stakeholders’ moral hazard behavior. Hoarding of compe-

⁵⁸ For a comparison of the Czech and Polish approaches with a view to bank and corporate restructuring, see Weill (2002).

⁵⁹ In this respect, Pistor (2006) notes a high level of convergence between legal systems throughout the CESEE MS (despite differences in the pattern of legal change), which was most likely driven by the import of similar external legal solutions and foreign technical assistance.

Chart 4

Development of Governance Indicators¹ in the CESEE MS

Source: Kaufmann, Kraay and Mastruzzi (2009), OeNB.

¹ The governance indicators are measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes.

² The CESEE MS aggregate is the arithmetic mean of the data published for the individual CESEE MS.

³ The overall governance indicator is the arithmetic mean of the six subindices.

tences, reputation concerns or simply financial interests may have led to “bureaucratic forbearance” and the pursuit of the “as little trouble as possible” strategy (Fink and Haiss, 1999). Second, difficulties may have also arisen out of intra-stakeholder relationships. Conflicting goals or discord over the scope of competences may delay banking reform and the recovery of weak banks.

6.5 International Governance

Financial liberalization, rapid development of information technology and financial innovation have brought about far-reaching globalization of banking services in the last few decades (Alexander and Dhumale, 2001), both via direct foreign lending/borrowing and via cross-border mergers and acquisitions. At the same time, banks have become more integrated with financial markets (Boot and Thakor, 2009). The CESEE MS were a key target region in this process, as they opened up their banking sectors in the run-up to EU membership. The market presence of foreign banks in the region soared and more recently several CESEE MS banks have started to enter foreign markets (mostly with an intra-regional focus).

To overcome the governance problems related to the internalization of the banking industry, efforts have been undertaken to harmonize regulatory, supervisory and corporate governance standards internationally under the leadership of the Basel Committee for Banking Supervision. These standards provide not only a broad regulatory framework and disciplining mechanism for the CESEE MS, but also the regulatory guidelines for CESEE MS policy makers and an important transmission channel of institutional and regulatory innovations (Ivaschenko and Brooks, 2008).

The applicability of these international norms to transition economies was initially limited, however, as these standards were developed for sound financial institutions operating under stable macroeconomic conditions. In particular, the use of the same standards (especially as regards capital requirements) in transition economies, which have displayed a higher level of risk and macroeconomic volatility than advanced economies, does not provide the same level of protection as in developed markets. During economic transition stricter regulations were thus regarded as preferable (Lindgren, Garcia and Saal, 1996; Arun and Turner, 2004) and were, indeed, applied in many countries. Furthermore, as Alexander and Dhumale (2006) argue, international standards are no panacea and have to be complemented by national regulations in order to account for differences in political, economic and legal environments. Finally, some of these standards potentially give rise to moral hazard (Schüler, 2003) and thus challenge bank regulation and supervision in countries, such as the CESEE MS, whose banking systems are dominated by internationally operating foreign banks.

On this note, Basel II seems to be an important tool for fostering prudent banking policies by increasing risk awareness and creating a level playing field for internationally operating banks. However, the Basel II debate has mainly focused on the risks associated with the first pillar, i.e. capital requirements, and not (yet) on those related to the second and third pillars, which, however, lie at the core of the governance debate, namely market discipline and the supervisory review process. This is presumably going to change now as the global financial turmoil has put the spotlight on these issues.

7 Concluding Remarks

This survey of the literature argues that the efficiency and soundness of banking systems critically depend on the design and quality of banks' governance arrangements. Failures within the different dimensions of the "governance nexus" are often a major factor behind banking distress. Thus, effectively restraining agency problems will have a considerable impact on the efficiency of capital allocation and economic growth prospects. Hence, to be successful, banking reforms have to go hand in hand with a redesign of the incentive structures for all the relevant actors in the banking system, and also have to take due account of the special characteristics of banks.

As revealed by this literature survey, considerable progress has been achieved in all the CESEE MS since the onset of transition to overcome prevalent shortcomings in bank governance. The European integration process and the increased market presence of foreign banks in the region have driven this development. The steadily growing number of governance codices at both the individual bank and the banking sector level, indicates that the CESEE MS have recognized the importance of good governance. As such codices are, however, often nonbinding ("soft law"), implementation seems still inadequate in some countries (Gandy et al., 2007). In fact, as the current crisis has shown, implementation of such mechanisms has proved far from adequate in mature markets as well.

The experiences of the CESEE MS economies provide important lessons for banking reform in less advanced transition economies. Based on a comprehensive notion of bank governance, which incorporates internal, external, corporate, in-

stitutional and international governance issues, the experience of the CESEE MS shows that any incentive-compatible banking reform should focus on:

- Creating a conducive business framework (“macro level”) by (1) ensuring sound and credible monetary and fiscal policies, (2) strengthening the institutional, judicial and legal infrastructure, (3) increasing transparency via better disclosure practices, (4) introducing proper accounting and auditing standards, and (5) fostering capital market development with a view to improving and deepening complementary governance structures;
- Promoting banking sector developments (“meso level”) by (1) adopting risk-sensitive and cycle-proof bank regulations, (2) establishing profound supervisory structures, which are aware of the risks associated with financial globalization and (3) enhancing market discipline;
- Enabling a recovery of individual banks (“micro level”) by (1) quickly solving the bad debt problem and restructuring bank balance sheets, (2) recapitalizing banks (if necessary) in a well-defined, transparent and credible manner, (3) privatizing banks early and mainly (not necessarily exclusively) with the involvement of reputable foreign banks as strategic investors, (4) hardening budget constraints in the corporate sector as well as (5) improving financial literacy and management know-how to allow for a better understanding of risks and the importance of business leadership.

It takes time to create operational business frameworks, functioning regulatory and supervisory systems and efficient banking market structures. This makes the proper sequencing and timing of reform measures even more important to avoid micro governance problems. Developments in the CESEE MS in fact confirm that banking distress was often the result of mistakes in banking reforms. Also, there is no “one size fits all” approach for the proper governance of banks in the CESEE MS. After all, the applicability and effectiveness of governance arrangements also depend on cultural and historical factors, but likewise on the regulatory, institutional and political setting. Consequently, policy recommendations have to take into account country-specific factors (Berglöf and Thadden, 1999; Oman, 2001).

The strength of the governance reforms carried out so far in the CESEE MS is now being seriously put to the test in a fragile global economic and financial environment. As governance problems are among the root causes of the current global financial crisis, the traditional mechanisms of bank governance are being challenged. This implies that governance failures are an endogenous source of financial instability. But there are also many other open issues regarding the agency relationships and interactions between various stakeholders and the different dimensions of the governance nexus, the directions of causality or the role of newly emerging stakeholders in banks’ governance.

In this context, it is critical to stress the dynamic aspect of bank governance, which not only calls for greater transparency, but also for a continuous adaptation of the regulatory and supervisory framework (regarding both the sectoral and the individual bank level) to the needs of a rapidly changing business environment. This is certainly not an easy task, especially in light of financial globalization, i.e. the increasing role of globally active financial conglomerates/holding companies, and financial and technological innovation of recent decades. In fact, as the experience from the current global financial turmoil shows, rapid financial innovation (resulting in ever more complex financial markets and sophisticated financial

products) and increasingly complex financial holding structures may fundamentally challenge bank governance practices, from the point of view of both insiders and outsiders. As to future academic work on these issues, it will be worthwhile to revisit some of the findings of the literature analyzed in this paper in order to see to what extent they still hold (or need to be modified), when the recent financial crisis experience is taken into account.

Dynamic aspects are critical for bank governance in the CESEE MS for at least three reasons. First, the changing nature of bank refinancing in the CESEE MS challenges banks' governance. The increased reliance on external (mainly parent bank) financing that was observed earlier in this decade in many CESEE MS highlights the relevance of parent banks in the governance of CESEE MS banks.

Second, recent years saw a change in banks' lending behavior in the CESEE MS, with lending for consumptive (and real estate) purposes gaining more weight. This challenges the corporate governance role of banks, which according to the prevalent literature primarily targets the relationship between banks and their corporate borrowers, and shifts attention to "retail governance." This in turn may be more challenging given the heterogeneity of retail borrowers and fairly low individual loan sizes, which not only limits information "reusability," but also possibly puts limits on monitoring efforts.

Third, potential future disintermediation – against the background of gradual market saturation with basic banking services, increasing demand for more sophisticated financial products and maturing capital markets – may lead banks to seek business opportunities in new (and possibly higher-risk) market segments. These challenges stress the need for better risk management practices, stepped-up bank supervision, more intensive home-host supervision coordination and close cooperation between bank supervisors and the supervisory bodies responsible for non-bank financial intermediaries.

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Could Markets Have Helped Predict the Puzzling Exchange Rate Path in CESEE Countries during the Current Crisis?

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In the present paper we examine whether financial markets could have helped predict exchange rates in selected Central, Eastern and Southeastern European (CESEE) economies, namely the Czech Republic, Hungary and Poland, during the current financial crisis. To this end, we derive risk-neutral densities from the implied volatilities of FX options, which approximate market expectations about exchange rate developments. Based on these risk-neutral density estimates, we then assess the out-of-sample predictive power of indicators. The forecasting results suggest that models based on FX options are inferior to the random walk in terms of the forecasting error, confirming a stylized fact about the short-term forecasting of exchange rates. Yet, we also find that, for the Czech Republic and Poland, risk-neutral densities contain useful information on the direction of change of the exchange rate.

JEL classification: C11, C32, C53, F37, G14, G17

Keywords: Options, implied volatility, risk-neutral density, exchange rate forecasting, Bayesian model averaging, subprime crisis, emerging markets

1 Introduction

The current financial and economic crisis has had a rather unexpected impact on the foreign exchange markets in Central, Eastern and Southeastern European (CESEE) non-euro area countries with flexible exchange rate regimes. This study focuses on the Czech Republic, Hungary and Poland (in the following referred to as CESEE-3), whose currencies – the forint, the Czech koruna and the złoty – appreciated heavily vis-à-vis the euro during the first phase of the global credit crunch, i.e. between the summer of 2007 and the fall of the U.S. investment bank Lehman Brothers in September 2008. This was quite surprising given that already in this first phase of the global credit crisis, financial markets were severely hit by widespread distrust and reduced risk appetite. In the subsequent period until early March 2009, the negative liquidity shock affecting financial markets following the Lehman Brothers collapse impacted dramatically on investors' perceptions. Suddenly market attention shifted to the external positions of the CESEE-3 and the deteriorating real economy. As a consequence, the forint, Czech koruna and złoty came under heavy pressure. In March 2009, market sentiment turned around and the CESEE-3 currencies have since recovered significantly.

Were these exchange rate developments and summersaults that unexpected or could they – to some extent – have been predicted? Despite the seminal paper by Meese and Rogoff (1983), which shows that in the short run the predictive quality of the random walk model is superior to that of the most relevant economic models for the exchange rate, various approaches have emerged in the literature that

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² A major part of this joint paper was written when Jesús Crespo Cuaresma and Tomáš Slačik visited Česká národní banka (CNB) in September 2008 and Adam Geršl paid a brief visit to the OeNB (Foreign Research Division) in July 2009. These visits were part of the regular cooperation between the CNB and the OeNB.

have tried to challenge this stylized fact. For the very short run, one approach suggests using the volatility implied by FX options, which, according to some authors, contains information on future exchange rate developments as it reflects market sentiment and beliefs.³ The use of such a market-based indicator is in line with Crespo Cuaresma and Slačik (2009), who review standard early warning indicators for currency crises in the framework of model uncertainty and conclude that indicators which mirror market sentiment (unlike fundamental variables) have some predictive power with respect to recent dramatic exchange rate moves.

The objective of the present paper is to explore whether the implied volatility of FX options vis-à-vis the euro in the CESEE-3 contains information on future exchange rates and, hence, whether such information could have been used to predict the exchange rate during the crisis. Since information on market sentiment and beliefs can be expressed in terms of the probability distribution over the expected exchange rate, we employ a method developed by Malz (1997) to extract an estimate of such a density from observed option prices at each point in time.

From the densities obtained we compute various statistics, such as the moments or the probability of a depreciation/appreciation exceeding a certain threshold. In the next step, we assess the out-of-sample forecasting ability of these density-based statistics along with other financial market variables, such as stock indices or short- and long-term interest rates within the framework of vector autoregressive (VAR) models. The fact that there is no finite, well-specified set of explanatory variables (and lags thereof) to be included in the VAR model gives rise to a serious problem of model uncertainty. We address this issue by employing Bayesian model averaging techniques. Besides the model averaged forecasts, we present predictions of the “best” model in the Bayesian sense, i.e. the model with the highest posterior probability, and predictions based on simple bivariate models including the exchange rate and a constructed financial sentiment indicator.

Our results are mixed. On the one hand, they indicate that none of the models employed improves forecasts over the random walk model in terms of the root mean square forecasting error. This outcome thus confirms the above-mentioned stylized fact about the short-term forecasting of exchange rates made well known by the contribution of Meese and Rogoff (1983). On the other hand, risk-neutral densities seem to provide some information on the direction of change of the exchange rate, particularly in the case of the Czech Republic.

The paper is structured as follows. In the next descriptive section, we analyze exchange rate developments in the Czech Republic, Hungary and Poland since these countries’ EU entry, with a particular focus on the current financial crisis. Section 3 explains the method we used to extract risk-neutral probability distributions from quoted option prices and describes the data as well as some basic features of FX option markets in the CESEE-3. In section 4, we shed some light on how we address the problem of model uncertainty and conduct the forecasting exercise. Section 5 concludes.

³ See e.g. Cincibuch and Bouc (2004) for a discussion.

2 Exchange Rates of the CESEE-3 Currencies during the Crisis – A Puzzle

The evolution of exchange rates in the CESEE-3 during the global financial crisis between 2007 and 2009 has been sort of a puzzle.⁴ The three panels of chart 1 depict the development of the forint, Czech koruna and złoty (the blue line in each panel) against the development of the one-month at-the-money (ATM)⁵ implied volatility (magenta line) in the period from 2004 to June 2009. In terms of the exchange rate development, the whole period can be tentatively divided into four subperiods. The first period, ranging from the entry of these economies into the EU in 2004 until the outbreak of the global credit crisis in summer 2007, was marked by trend appreciation due to productivity increases as well as prevailing risk appetite. The only exception to the appreciation trend is Hungary, with a more volatile exchange rate, which was at least in part associated with high fiscal deficits during this period: After consolidation had finally started in 2006, it weighed on the country's growth performance.

A second period can be recognized between the beginning of the crisis in summer 2007 and the fall of the U.S. investment bank Lehman Brothers in September 2008. During this time the appreciation trend sped up in the Czech Republic and in Poland, and the forint started to appreciate heavily vis-à-vis the euro area. In light of the widespread distrust and reduced risk appetite, which characterized financial markets at that time, this development may seem surprising. Two main causes are cited as an explanation for this development: the unwinding of carry trades and the “safe haven” hypothesis.

The very low short-term interest rates on the CESEE-3 currencies, especially the Czech koruna, predestined them as financing currencies for carry trades. As the risk appetite diminished in markets when the U.S. subprime problems hit a number of global financial institutions via structured instruments, these institutions started to unwind carry trades given their nature as a risky and speculative investment strategy. Evidence for the Czech koruna, as described in the Financial Stability Report 2007 of Česká národní banka (ČNB, 2008), suggests that this development might have been important in the first two or three months after the beginning of the global crisis, but can hardly explain the appreciation trend over a longer horizon.

The “safe haven” hypothesis (see ČNB, 2009) is a more comprehensive, albeit also questionable, explanation for the appreciation of the CESEE-3 currencies in the crisis period. This hypothesis is based on the observed fact that the global financial crisis first spread only across advanced countries, where banks were holding toxic assets linked to subprime mortgages. In contrast, emerging countries in Europe were not directly hit, as banks in the region – many of them foreign owned – concentrated on more traditional banking activities, such as deposit collection and lending, given the yet unsaturated markets in these countries. The direct holding of subprime securities was negligible in the CESEE-3 banking sectors, which led many market participants to believe that, instead of the U.S. dollar or Western European currencies, the CESEE-3 currencies would take on the role of

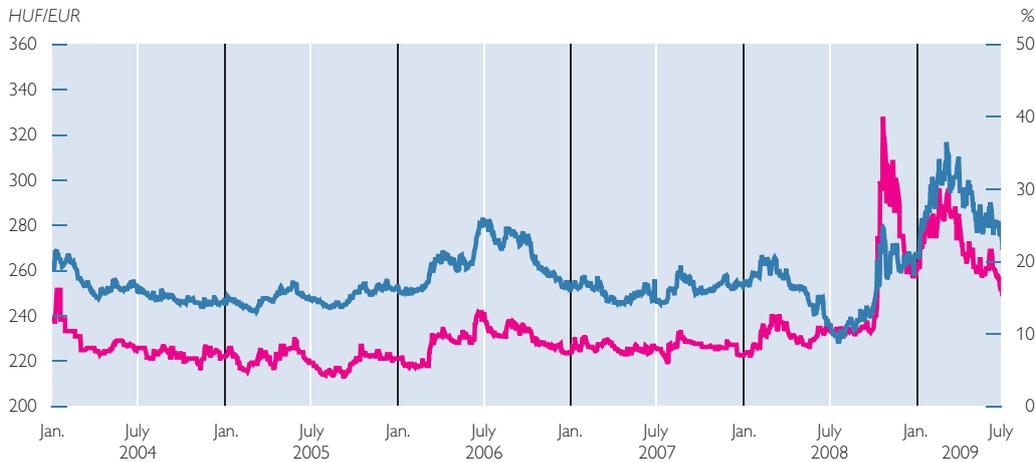
⁴ For a detailed discussion on financial market developments in Central, Eastern and Southeastern Europe during the crisis, see box 1 in the OeNB's Focus on European Economic Integration Q2/09 and Q4/09.

⁵ For an explanation of moneyiness, see section 3.1.

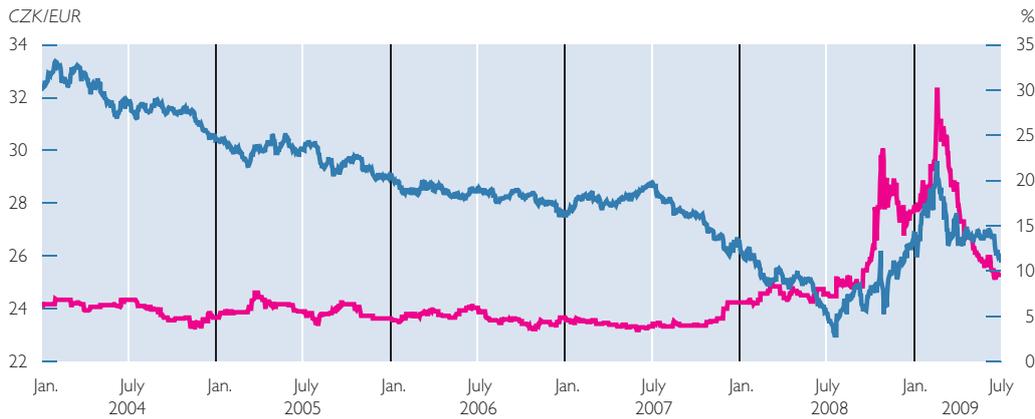
Chart 1

Development of Exchange Rates and One-Month ATM Implied Volatilities

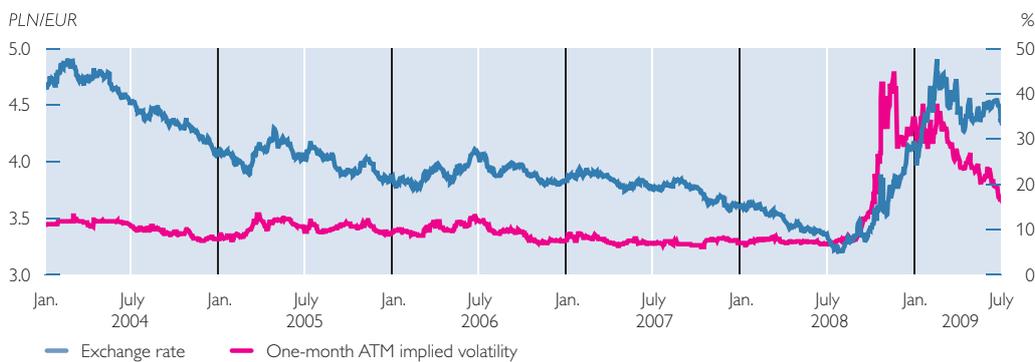
Hungary



Czech Republic



Poland



Source: Bloomberg.

Note: Cutoff date: July 10, 2009.

a safe haven. Investors shed assets denominated in U.S. dollar or euro and started investing in CESEE-3 assets.

We can discern a third period starting with the Lehman Brothers collapse in mid-September 2008 and lasting until early March 2009. The liquidity shock in global financial markets caused by Lehman's fall led investors to focus on the dependence of CESEE economies on external funding. Suddenly, the negative external positions of the banking sectors of some economies in this region, such as Hungary and the Baltic countries – which international investors had up to then considered to be within an acceptable range – played an important role in increasing risk aversion toward the CESEE region as a whole. In chart 1, this abrupt change in market sentiment is pictured by the magenta line, which clearly portrays the unprecedented rise of the implied volatility in the CESEE-3 during this period of increased uncertainty. Given the liquidity shock triggered by the Lehman failure, it was feared that these countries would not be able to roll over their external (mainly short-term) debt. Moreover, real economic developments in the CESEE-3 started to give signs of weakness, driven by these countries' dependence on the macroeconomic development in the euro area, which deteriorated significantly as a consequence of the financial crisis. The depreciation pressures that emerged also put the extent of foreign currency lending in most CESEE countries into the spotlight, except for the Czech Republic, where foreign currency lending had been less pronounced. Fears that depreciation would further increase the problems of the indebted private sector, already hit by the lack of external demand, accelerated the depreciating path, especially in the first two months of 2009.

While all CESEE economies were hit by the increased risk aversion toward the region, the three economies analyzed presented different characteristics in this respect. The risk aversion drivers mentioned above were mostly valid only for Hungary, given its large external funding needs, widespread foreign currency lending and particularly high dependence on external demand. When the domestic bond market dried up completely in early October 2008, Hungarian authorities asked for IMF assistance. In contrast, the Czech Republic launched a strong communication campaign emphasizing the positive external position of its banking sector⁶ (thus implying virtually no need for external funding) and the absence of foreign currency lending to households (and relatively low foreign currency lending levels vis-à-vis the corporate sector). Given the high openness of the Czech economy and the important role of the manufacturing sector, the impact on the real economy was nevertheless large. Poland – also due to its size – was less dependent on external demand and is one of the few countries where the impact of the crisis on domestic economic activity was relatively subdued.

Finally, a fourth period starting in March 2009 is characterized by a certain recovery of the CESEE-3 currencies from the low levels recorded in February/March 2009. When global financial markets stabilized and IFI/EU assistance to CESEE countries in need was stepped up, CESEE countries experienced a slow return of optimism in the financial markets – mainly stock but also exchange rate

⁶ *At the end of 2008, the Czech banking system had a positive external position of around 6% of GDP, mainly due to a very high deposit-to-loan ratio (130%). The Polish banking system had a negative external position of –7% of GDP (with a deposit-to-loan ratio of 92%), and the Hungarian banking system's external position was negative as well, at –18% of GDP (with a deposit-to-loan ratio of only 71%). For a comparison with other EU countries, see ČNB (2009, pp. 49–50).*

markets – patently documented for the CESEE-3 in chart 1 by the gradual decline of both the exchange rate and the implied volatility.

3 Would Markets Have Been Able to Predict the Exchange Rate Path?

Against this backdrop, we raise the question whether financial markets were caught by surprise by the exchange rate path described above. Put differently, we wonder whether markets could have had some predictive power with respect to the future exchange rate even though Meese and Rogoff (1983) showed that in the short run exchange rates follow the random walk. Crespo Cuaresma and Slačik (2009), who review standard early warning indicators for currency crises under the aspect of model uncertainty, conclude that only indicators which mirror the market sentiment (unlike fundamental variables) have some predictive power with respect to recent dramatic exchange rate moves. In the same vein, several studies⁷ have shown that the implied volatility of FX options, which reflects market sentiment and beliefs, contains information on future exchange rate performance.

Using these findings, we hence proceed to explore whether observed FX option prices provide some information not yet incorporated into the price of the underlying spot exchange rate. Since information on market beliefs can be neatly expressed in terms of a probability distribution, the task is to estimate the density function based on FX options in order to draw inference on it and test its predictive ability.

3.1 Extracting Risk-Neutral Density from Option Prices

A European option provides the holder with the right (not obligation) to buy (in the case of a call option) or sell (put option) an asset on a certain expiration date at a certain price, the so-called strike or exercise price. At maturity T , a European call option with a strike price X thus yields either the difference between the spot asset price (S_T) and the strike price if the option is exercised, or 0 otherwise. The price $c(t, X, T)$ of a European call option at time t thus corresponds to the discounted value of the option's expected payoff at T :

$$\begin{aligned} c(S_t, t, X, T, r) &= e^{-r\tau} E[\max(S_T - X, 0)] \\ &= e^{-r\tau} \int_X^\infty (S_T - X) \pi(S_T) dS_T \end{aligned} \quad (1)$$

where $\tau \equiv T - t$ is the time to maturity, r stands for the appropriate risk-free domestic interest rate and $\pi(\cdot)$ denotes the risk-neutral probability density function (RND) of the asset price S_T .

To extract the RND from a European call option price, we can use the result derived by Breeden and Litzenberger (1978), according to which the RND is proportional to the second derivative of the call price with respect to the strike price:

$$\pi(S_T) = e^{r\tau} \frac{\partial^2 c(t, X, T)}{\delta X^2}. \quad (2)$$

Option prices, determined by the demand-supply relationship in the market, are typically transformed to the implied volatility in units called vols that are used to quote option “prices.” Hence, option prices expressed in currency units are not

⁷ See e.g. Cincibuch and Bouc (2004) for a discussion.

directly observable and the derivative of the call price cannot be obtained in a straightforward manner. For this transformation, practitioners employ the extension of the Black-Scholes formula⁸ to FX options by Garman and Kohlhagen (1983), according to which the value of a currency call option is given in accordance with equation (1) by

$$c^{fx}(S_t, \tau, X, \sigma, r, r^*) = e^{-r^* \tau} S_t \varphi \left[\frac{\ln\left(\frac{S_t}{X}\right) + (r - r^* + \frac{\sigma^2}{2})\tau}{\sigma\sqrt{\tau}} \right] - e^{-r\tau} X \varphi \left[\frac{\ln\left(\frac{S_t}{X}\right) + (r - r^* - \frac{\sigma^2}{2})\tau}{\sigma\sqrt{\tau}} \right] \quad (3)$$

where r and r^* represent the domestic and foreign risk-free domestic interest rate, $\varphi(\cdot)$ is the standard cumulative normal distribution function and σ the volatility parameter. Hence, according to the Black-Scholes model, there is one-to-one mapping between the option price and the volatility parameter or, in other words, each option price determined in the market implies a unique volatility parameter σ . Therefore, in order to derive the RND, we first transform observed data on implied volatilities at time t into option prices as a function of the strike price.

First of all, we need to define the concept of moneyness. An option is said to be at the money if the strike price equals the price of the underlying asset. In contrast, a call (put) option is in the money if $S_t > X$ ($S_t < X$) or out of the money if $S_t < X$ ($S_t > X$). However, rather than in terms of the spot and the strike price the moneyness of an option is usually expressed by the option's delta. Delta is defined as the rate of change (first derivative) of the Black-Scholes option price with respect to the spot exchange rate:

$$\Delta(S_t, \tau, X, \sigma, r, r^*) = \frac{\partial c^{fx}(S_t, \tau, X, \sigma, r, r^*)}{\partial S_t} \quad (4)$$

Delta is thus a measure for the extent to which an option is exposed to changes in the price of the underlying asset and ranges between 0 and 1 in absolute value terms (negative for puts and positive for calls). An at-the-money option has a delta of approximately 0.5 in absolute value. The more an option is in the money, the closer its delta to 1; the more it is out of the money, the smaller its delta (in absolute values).

Although the Black-Scholes model assumes that irrespective of moneyness or time to maturity all options on the same currency have an identical implied volatility, in practice it is often observed that out-of-the money options have higher implied volatilities than at-the-money options. This phenomenon, often referred to as the volatility smile, suggests that the distribution of exchange rates has fatter tails (i.e. higher kurtosis) than the normal distribution.

Against this backdrop, in the first step we need to construct a continuous volatility smile from observable data. We do this in the spirit of Malz (1997) by inter-

⁸ While the Black-Scholes model, developed by Black and Scholes (1973) for pricing stock options, has facilitated the exponential growth of derivatives and is widely used, it is certainly not undisputed as it is based on several simplifying (arguably simplistic) assumptions. For example, one of the shortcomings of the Black-Scholes model is the mixing of discrete-in-time and continuous-in-price space. Problematic is also the fact that the model abstracts from important market elements (e.g. the role of liquidity) or real market features, particularly volatility smiles. (See below a brief discussion on the latter and e.g. Chorafas (2008) for a detailed discussion on the shortcomings of the Black-Scholes model).

polating at each point in time a particular functional form through the prices of three commonly traded option products: (1) At-the-money forwards, for which the strike price corresponds to the forward price, (2) risk reversals and (3) strangles. The latter two are different combinations of out-of-the money call and put options. The interpolation function proposed by Malz (1997) is linear in the at-the-money volatility, the risk reversal price and the deviation of delta from 0.5, and quadratic in the strangle price and the deviation of delta from 0.5. Hence, we obtain a functional form for the volatility as a function of delta ($\sigma_t(\delta)$), which can be interpreted as a Taylor approximation to $\sigma_t(\delta)$ at $\delta=0.5$.⁹

As we eventually want to estimate the RND by second-differentiating equation (3) with respect to the strike price in accordance with equation (2), the thus far derived volatility smile in the delta-volatility space has to be translated in the next step into the strike price-volatility space. This can be easily done by substituting delta with the derivative of the Black-Scholes formula with respect to the strike price in the interpolated volatility smile function, so that we get $\sigma_t(\delta(S_t, \tau, X, \sigma, r, r^*)) = \sigma_t(X)$. Unfortunately, as this function cannot be inverted, we cannot solve for X analytically. However, we can use an iterative grid search procedure to find for each value of σ the corresponding value of X . We thus transform the interpolated volatility smile in the delta-sigma space into a continuous function in the strike price-volatility space.

For the sake of illustration, the two panels of chart 2 show – for Hungary – the volatility smile for the option combination described above in the delta-sigma space and in the strike price-sigma space at three different points in time:

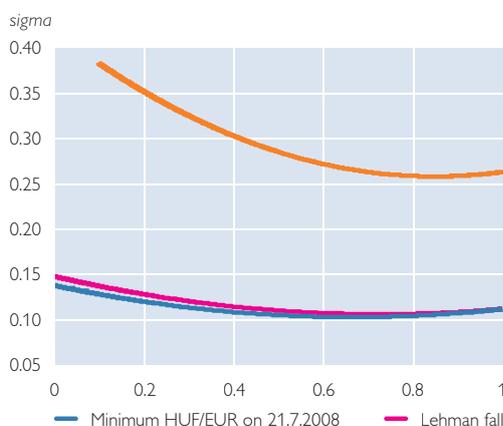
- (1) On a representative day in tranquil times prior to the outbreak of the crisis,
- (2) on the day of the Lehman Brothers collapse and
- (3) on the day when the forint reached the trough vis-à-vis the euro.

The message to be taken out of chart 2 is twofold. On the one hand, it is evident that the implied volatility is higher in the out-of-the-money area (lower delta

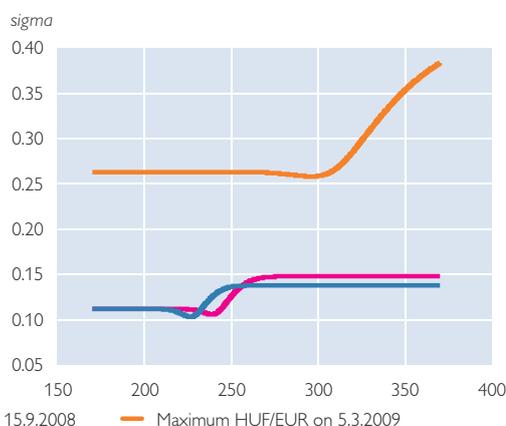
Chart 2

Example of Volatility Smile: Hungary

Delta-Sigma Space



Strike Price-Sigma Space



Source: Authors' calculations.

⁹ See Malz (1997) for a detailed discussion.

and higher strike price) of the combined option product. On the other hand, on the day of the fall of Lehman Brothers, the implied volatility of a particular delta/strike price did not rise significantly, but at the peak of the crisis, it was several times higher than in normal times.

Substituting in the next step the strike price-volatility combinations derived through the grid search into equation (3), we obtain a continuum of expressions for c_t^{fx} . The (numerical) second differentiation of the latter multiplied by $e^{r\tau}$ in accordance with equation (2) yields the risk-neutral probability density function. We can summarize the characteristics of the RND, using moments or other statistics derived from the estimated distributions. In our case, we calculate the standard deviation, skewness, kurtosis as well as the probability that the exchange rate will appreciate/depreciate by 3% or more, which we use in the forecasting exercise below.

3.2 Data and Some Basic Features of FX Option Markets in the CESEE-3

For the analysis in this paper, we use data on FX options for all of the CESEE-3 currencies. The FX markets in the CESEE-3 are structured as typical over-the-counter (OTC) markets, where most transactions take place in the interbank market, often with nonresident (London-based) banks or even between nonresident banks. Given the high relevance of the euro, euro options dominate the market.¹⁰ Among nonfinancial institutions, export-oriented companies very often use option markets (via local banks) to hedge their FX risk. Their demand triggers further contracts as local banks hedge their option positions immediately with nonresident banks, usually their parent banks (ČNB, 2009).

Given the OTC nature of the FX option market and the fact that a number of FX option contracts are closed between nonresident institutions, it is difficult to get comparable and timely data on the size and liquidity of this market. One of the most reliable sources of comparable data is the Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity conducted by the BIS, of which the most recent run was organized in April 2007. According to these data, of the CESEE-3 currencies, the Polish zloty records the biggest FX option market in absolute terms, with an estimated daily average volume of USD 940 million. This contrasts with USD 269 million for the Hungarian forint option market and USD 226 million for the Czech koruna option market.¹¹ By way of comparison, the average daily turnover in the Swedish krona option market was USD 2,885 million.

The data are sourced from UBS and the exchange rate is quoted as domestic currency per euro. Given that UBS is not present locally in the CESEE-3 countries and serves as a typical nonresident counterparty in the option market, the data are representative of both the local (local interbank) and the nonresident (global interbank) market.

For our computations we use daily FX option data from the Czech Republic, Hungary and Poland for the period from April 1, 2003, to July 10, 2009. We make use of quoted one-month 25 delta put and 25 delta call option implied vola-

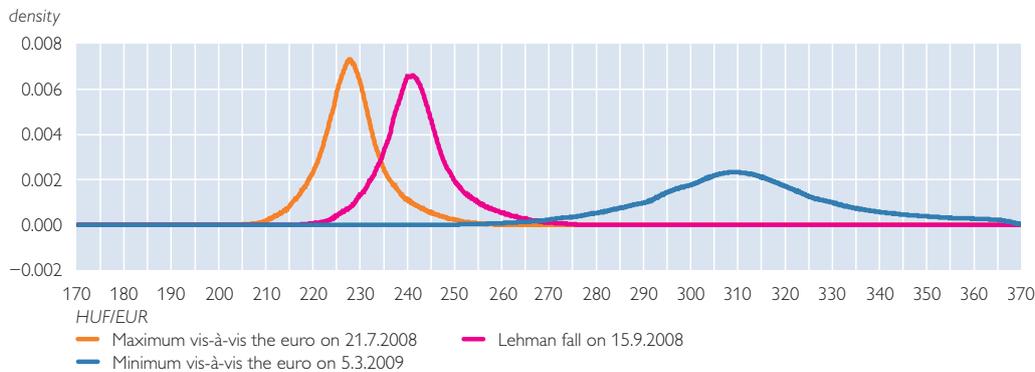
¹⁰ This was not always the case: As shown by Cincibuch and Bouc (2004), U.S. dollar options were as relevant as Deutsche mark options in the Czech Republic in 1997.

¹¹ The figure for the Czech Republic is comparable to the estimate of the average daily turnover in 2004 of around EUR 100 million given in Cincibuch and Bouc (2004).

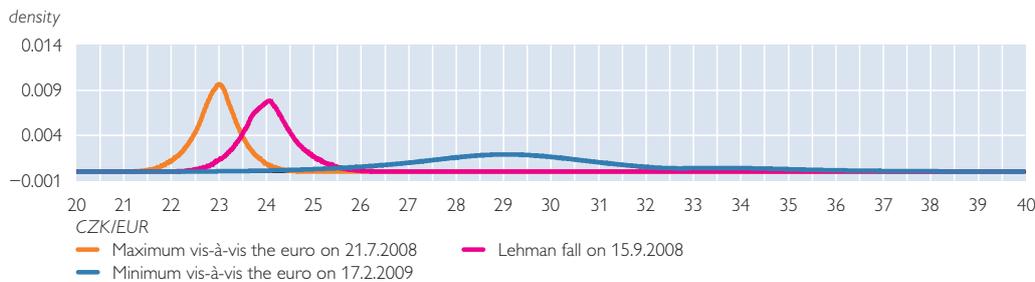
Chart 3

Risk-Neutral Probability Distribution Derived from the Implied Volatility

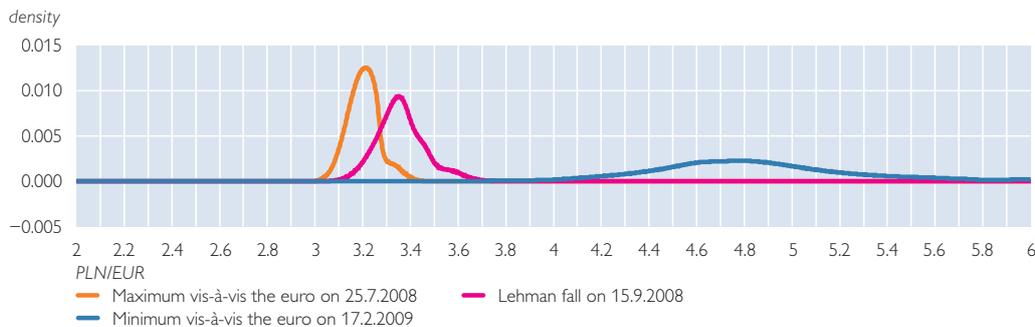
Hungary



Czech Republic



Poland



Source: Authors' calculations.

tilities as well as one-month ATM implied volatility. The reference exchange rate is domestic currency against the euro. As mentioned above, broader coverage of different delta put and call options would be preferable for estimating risk-neutral density, but such data are not available for all currencies and all times. Therefore, we transformed quoted implied volatilities into implied volatilities of risk reversal (25 delta call minus 25 delta put) and strangle (average of implied volatilities of 25 delta put and 25 delta call options minus ATM volatility) contracts.

The Malz (1997) method described above produces a risk-neutral density for each day for which option prices are available. Chart 3 illustrates RNDs for all three analyzed currencies on three specific dates during the crisis period:

- (1) The peak (strongest value of the respective currency) in the safe haven period (July 2008),
- (2) the Lehman Brothers fall on September 15, 2008, and
- (3) the day on which the respective currencies were weakest vis-à-vis the euro in the risk aversion period (February or early March 2009).

Chart 3 shows that after the fall of Lehman Brothers a systematic move toward a weaker exchange rate took place (the mean of the distribution moved to the right in all three cases), but the uncertainty surrounding the average expected level increased only slightly (the bell shape is only slightly squeezed compared with the one before the crisis). In contrast, at the peak of the risk aversion period the currencies were expected to stay at a depreciated level and also the uncertainty was substantially higher.

4 Out-of-Sample Properties of Risk-Neutral Densities

4.1 Evaluating the Out-of-Sample Predictive Ability

In this section, we assess the out-of-sample forecasting ability of exchange rate models containing statistics based on the estimated densities described in the previous sections. We limit ourselves to the evaluation of the predictive power within the class of vector autoregressive (VAR) models, specified as

$$Y_t = A_0 + \sum_{j=1}^p A_j Y_{t-j} + \varepsilon_t \quad (5)$$

where Y_t is a k -dimensional vector composed by the change in the (log) exchange rate and $k-1$ other variables, which are assumed to potentially contain information about future developments of the exchange rate. The vector of intercept terms is given by A_0 , A_j , for $j=1 \dots p$, which are assumed to be $k \times k$ matrices, and ε_t is a multivariate Gaussian error term with zero mean and a variance-covariance matrix Σ . In principle, several statistics obtained from the risk-neutral densities, as well as other explanatory variables, could be included in the VAR model given by (5), which gives rise to the extra problem of model uncertainty. Table 1 presents the variables we consider potential elements of the vector Y_t in our study. They include statistics from the estimated densities as well as other financial market variables, such as stock indices and short- and long-term interest rates.

The first issue is how to choose the set of variables which should be included in the forecasting model. We approach this issue of model uncertainty by using Bayesian model averaging techniques.¹² In concrete terms, the method we apply is an example of Bayesian Averaging of Classical Estimates (BACE) as presented by Sala-i-Martin, Doppelhofer and Miller (2004) and used in the framework of forecasting with VAR models by Crespo Cuaresma (2007). The intuition is to form weighted averaged predictions from all possible specifications in the model space. The weights are proportional to the explanatory power of the respective models for the exchange rate, once the inclusion of a large number of parameters was penalized. We build the weights, using the Bayesian Information Criterion (BIC) (Schwarz 1978),¹³ whose use has been put forward in the literature as an instru-

¹² See Doppelhofer (2008) for a survey on the issue.

¹³ See Raftery (1995) for a discussion on the use of the BIC in model averaging.

ment to obtain approximation of posterior model probabilities in the framework of Bayesian model averaging (Raftery, 1995, and Clyde, 2000).

Building weights for the predictions computed from the individual models presents an extra complication, which emanates from the large number of models in the space of possible specifications. Fixing the exchange rate as a variable in the vector Y_t and assuming that there are K potential variables to form VAR models such as (5) implies that there are $p2^K - (p-1)$ possible models to evaluate. For large values of K and if we allow for specifications with long lag lengths, this figure becomes intractable. Markov Chain Monte Carlo Model Composite (MC³) methods have been proposed in the literature to deal with such large model spaces (Madigan and York, 1995). In our application, we make use of the MC³ method to reduce the number of models that need to be evaluated.

The prediction exercise is carried out as follows. We use daily data on the variables listed in table 1 for the period from April 1, 2003, to July 10, 2009, and divide them into an in-sample period (April 1, 2003, to July 31, 2007) and an out-of-sample period (August 1, 2007, to July 10, 2009). We compute model averaged forecasts by obtaining h-steps ahead forecasts from the models employed and by expanding the in-sample period recursively. The model weights are obtained in each case by using the information criteria corresponding to the exchange rate equation in (5) and are interpreted as the posterior probability assigned to each particular specification. We also obtain the predictions of the single specification which has the highest posterior model probability, which we use as a benchmark for comparison.

An important statistic that can be obtained within the model averaging framework is the posterior inclusion probability of a given variable, which is defined as the sum of the posterior probability of the models containing this covariate. This statistic can be interpreted as the probability that a variable belongs to the true model. Using the posterior inclusion probabilities, we also compute an early warning indicator, which we call the financial sentiment indicator (FSI). The FSI summarizes the dynamics of the variables which contain information about future changes in the exchange rate according to the results of our analysis. The index is constructed as follows:

$$FSI_t = \sum_{j=1}^K \left[\frac{\left(\frac{y_{jt} - \bar{y}_j}{\sigma_{y_j}} \right) P(y_{jt} | D)}{\sum_{l=1}^K P(y_{lt} | D)} \right], \quad (6)$$

where y_{jt} is variable j , $j=1, \dots, K$, and σ_{y_j} and $P(y_{jt} | D)$ are its standard deviation and posterior inclusion probability given data D , respectively.

In addition to the model averaged forecasts and the predictions of the model with the highest posterior probability (= “best” model), we also obtain predictions based on simple bivariate models including the exchange rate and the FSI (= index model).¹⁴ We consider VAR models which include the exchange rate together with any subset of the variables in table 1, and up to five lags for all variables in the

¹⁴ Our depreciation and appreciation probabilities refer to a threshold of 3%. Results for a threshold of 5% were also obtained, which were qualitatively similar to those using 3%. The results using the 5% threshold are available from the authors upon request.

Table 1

Variables Used in the Forecasting Exercise

<i>Variable</i>
Implied probability of an appreciation larger than 3%
Implied probability of a depreciation larger than 3%
Standard deviation of the risk-neutral density estimate
Skewness of the risk-neutral density estimate
Kurtosis of the risk-neutral density estimate
Stock returns (domestic economy)
S&P GSCI returns
EMBI returns
Stock returns (EUR)
Change in short-term interest rate differential with the euro area
Change in long-term interest rate differential with the euro area
EUR/USD exchange rate returns
Difference between implied appreciation and depreciation probabilities

Source: Compiled by authors, UBS.

model. This implies that our model space is composed of around 41,000 models. We use Markov Chain Monte Carlo (MCMC) methods to identify the most promising models in the model space. Starting with an estimated model M_j for a given in-sample period, we propose randomly, and then estimate, an alternative model from its neighborhood, defined as a model with one variable more or less and any number of lags. Let this model be denoted M_k . We move from M_j to this new model with a probability which is proportional to the exponent of the difference in the BIC for the exchange rate equation between M_j and M_k (see Raftery, 1995, or Clyde, 2000). This implies that we visit models which explain the data relatively well after accounting for the large number of parameters they include. Instead of computing and averaging predictions over the whole model space, we only average over the models visited by the chain. This procedure is repeated a large number of times and the models visited are recorded. In particular, we obtain out-of-sample predictions from each visited model, which we average in order to compute model averaged forecasts. We also identify the single model with the strongest data support (the model with the lowest BIC, which can be interpreted in Bayesian model averaging as the model with the highest posterior probability) and compute predictions based on this “best” model.

4.2 Out-of-Sample Forecasting Results

The results for each country are presented in table 2. We report the root mean square prediction error (RMSE), defined as $RMSE = \sqrt{\frac{\sum_{t=1}^N (S_t - \tilde{S}_t)^2}{N}}$, where

$S_t, t=1, \dots, N$ are the (log) exchange rate observations in the out-of-sample period (of size N) and \tilde{S}_t is the corresponding prediction of the model. And we also report the direction of change (DOC) statistic, which measures the proportion of forecasts where the change in the exchange rate was correctly predicted. Since we use data on options with a maturity of one month, we compute the forecasts at a 22 days-ahead horizon, which is the natural predictive horizon of the computed risk-neutral densities. As a benchmark for comparisons, we also include the results corresponding to the random walk model, which predicts the exchange rate in 22

Table 2

Out-of-Sample Predictive Ability Results

Czech Republic	RMSE	DOC
Averaged forecasts	2.994	0.561
Best model	3.009	0.563
Index model	3.015	0.699
Random walk	2.938	–
Hungary	RMSE	DOC
Averaged forecasts	12.787	0.427
Best model	18.005	0.419
Index model	4.002	0.472
Random walk	2.938	–
Poland	RMSE	DOC
Averaged forecasts	4.604	0.528
Best model	4.680	0.514
Index model	4.139	0.465
Random walk	2.938	–

Source: Authors' calculations.

Note: The root mean square prediction error (RMSE) is the square root of the average forecasting error, while the direction of change (DOC) statistic measures the proportion of forecasts where the change in the exchange rate was correctly predicted. The benchmark DOC of the random walk model is assumed to be 0.5.

days to be equal to the exchange rate level today. The results indicate that none of the models entertained improves forecasts over the random walk model in terms of RMSE, which ties in with the above-mentioned stylized fact on the short-term forecasting of exchange rates (Meese and Rogoff, 1983).

In spite of the discouraging results based on RMSE, we found in our analysis of the CESEE-3 that risk-neutral densities nevertheless seem to provide some useful information on the direction of change of the exchange rate. In particular, the results for the Czech Republic indicate very large improvements in the direction of change statistic for all possible prediction strategies (averaged forecasts, best model and bivariate model based on the artificial financial sentiment index). A slight improvement is also obtained in the case of Poland, albeit only marginally over the 0.5 DOC statistic implied by the random walk model.

In table 3 we identify the variables that are chosen by our MCMC search as the most robust in-sample determinants of the exchange rate. In our application, the method tends to visit only few models after the burn-in phase, which implies that there are single specifications that explain exchange rate dynamics in our samples much better than the rest. This manifests itself in the relatively small differences in the predictive ability between averaged results and those implied by the best model in table 2. The variables chosen in the best model, which systematically coincide with those receiving large weights in the averaging technique and in the construction of the FSI, include in all cases variables related to market sentiment as measured by the risk-neutral densities. As the posterior model probability is concentrated in very few specifications, the FSI is practically an unweighted average of the indicators identified in table 3.

Overall, our results thus suggest that in the Czech Republic and in Poland most of the available information has been incorporated into the currency price. Some additional information can, however, be extracted from the markets, which is relevant enough to somewhat improve the ability to forecast exchange rates in the CESEE-3 compared with naïve forecasting models. In Hungary, in contrast, option prices do not seem to contain information that would substantially help forecast exchange rate movements. Our analysis does not allow for any conclusions on whether these differences stem from a different degree of market efficiency, the market structure and liquidity or the rather specific macroeconomic fundamentals and very volatile environment in Hungary.

While our results, which attest to a rather limited predictive power of FX options, may to a large extent contrast with the findings in the existing literature (see e.g. Cincibuch and Bouc, 2004), it should be borne in mind that we tested the

Table 3

Components of the Financial Sentiment Index by Country

Variable	Czech Republic	Hungary	Poland
Change in long-term interest rate differential with the euro area			
Change in short-term interest rate differential with the euro area		x	x
Difference between implied appreciation and depreciation probabilities	x	x	x
EMBI returns			
EUR/USD exchange rate returns			
S&P GSCI returns			
Implied probability of a depreciation larger than 3%	x	x	x
Implied probability of an appreciation larger than 3%	x	x	x
Kurtosis of the risk-neutral density estimate	x	x	x
Skewness of the risk-neutral density estimate		x	
Standard deviation of the risk-neutral density estimate	x	x	x
Stock returns (domestic economy)			
Stock returns (EUR)			

Source: Authors' calculations.

markets' predictive power in a substantially different environment. For instance, the paper by Cincibuch and Bouc (2004) analyzes the predictive power of FX options prior to the currency crisis in the Czech Republic in 1997, which was preceded by massive structural problems and disequilibria. The outbreak of this "homemade" crisis of the first generation type was basically only a matter of time, endogenously determined by the markets themselves. The authors thus conclude that high option prices might have revealed speculators' positioning before their attacking the Czech koruna.

However, the current financial and economic crisis was imported to the countries under study from outside and had little in common with the idiosyncratic fundamental development. The CESEE-3 were affected by the general decline in risk appetite traceable to a crisis triggered in mature economies. In this context, the current crisis is more of the second generation type, with the countries shifting from a sustainable to an unsustainable equilibrium as a consequence of an exogenous shock, a sun spot. Small wonder that such a sun spot was not anticipated by the markets. Hence, further research is certainly needed to identify the causes of these differences found across countries and time.

5 Summary and Conclusions

Given the rather unexpected and puzzling exchange rate development in some Central, Eastern and Southeastern European countries during the current financial crisis, we examine whether financial markets could have helped predict exchange rate changes in this period. In particular, we derive from the implied volatilities of FX options risk-neutral densities, which approximate market perceptions and expectations of future exchange rate developments. We employ a method developed by Malz (1997), which is based on the Black-Scholes option pricing formula and which entails interpolating a particular functional form through the prices of commonly traded option products at each point in time. Based on the thus derived risk-neutral densities, we compute various indicators which are supposed to exploit all the information contained in the distribution and therefore precisely

describe market expectations about the exchange rate. Besides the moments of the distribution, we also calculate the probability that the exchange rate will appreciate/depreciate by 3% or more. Subsequently, we test the predictive power of these indicators and other financial sector variables in a VAR framework. We control for the high level of model uncertainty by employing Bayesian model averaging techniques.

We obtain mixed results on the predictive ability of market expectations as measured by the characteristics of the risk-neutral densities. Predictions based on models which include this information are inferior to those of the random walk in terms of the mean square forecasting error. Yet, risk-neutral densities seem to provide some useful information on the direction of change of the exchange rate for the Czech Republic and Poland. In contrast, option prices in Hungary do not seem to contain information on future exchange rate changes. In general, our results suggest a lower predictive power of FX options than the existing literature. Future research should thus focus on where the differences along the country and time dimensions come from, whether they have anything to do with different degrees of market efficiency and/or crisis generation and how the predictive power of financial markets changes in normal tranquil times. Our results indicate that the financial market information embodied in risk-neutral densities may contain interesting clues about exchange rate dynamics. RNDs may thus be a useful instrument for monetary authorities to learn about the expected exchange rate development.

Further research may shed light on the reasons for the differing results for the group of countries under study in this contribution. In particular, enlarging the set of models used to predict the exchange rate (by potentially including nonlinear models and specifications that explicitly account for the high frequency of the data) could improve the ability of risk-neutral densities to forecast exchange rates. On the methodological side, linking countries in the framework of a Global VAR (GVAR) model should prove to be a fruitful path of further research. In this case, the uncertainty concerning the choice of the weight variable linking countries together in the GVAR may also be modeled using Bayesian methods, such as those recently proposed by Crespo Cuaresma and Feldkircher (2009) for spatially correlated data. A generalization in this direction of the method put forward in this contribution would allow us to gain useful insights into contagion processes during financial crises. The model space may also be enlarged by including univariate or multivariate nonlinear time series specifications (e.g. Markov switching, threshold models, smooth transition models, to name the most popular ones), which would shed light on parameter heterogeneity and structural breaks in the data.

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How Did the Global Financial Crisis Affect the CESEE Region and Latin America?

A Comparative Analysis

This paper examines the impact the global economic and financial crisis had on two distinct emerging market regions, namely Central, Eastern and Southeastern Europe (CESEE) and Latin America. Similar to other emerging economies, both regions were initially surprisingly resilient as the crisis gathered momentum. They were, however, both strongly affected by the sharp retrenchment in capital inflows and the collapse of global demand that followed the demise of Lehman Brothers in September 2008. Notwithstanding differences in the channels of transmission and the intensity of the propagation, the short-term outcome in 2009 was similar for both regions: one of the deepest recessions in decades. At the same time, the worst case scenario of a fully-fledged financial meltdown occurred neither in the CESEE region nor in Latin America.

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Keywords: Financial crisis, Central, Eastern and Southeastern Europe, Latin America

1 Introduction and Key Structural Characteristics

This short paper discusses the impact of the global economic and financial crisis on two major emerging market regions: Central, Eastern and Southeastern Europe (CESEE) and Latin America.² Although there were differences in the channels of transmission of the crisis to these regions and in the intensity of the propagation, the short-term outcome in the real economy in 2009 was similar for both regions: one of the worst recessions in decades. Given that both regions differ in several important respects, the question arises of how structural and institutional features as well as policies before and during the crisis had affected the transmission of global events to the regions under review.

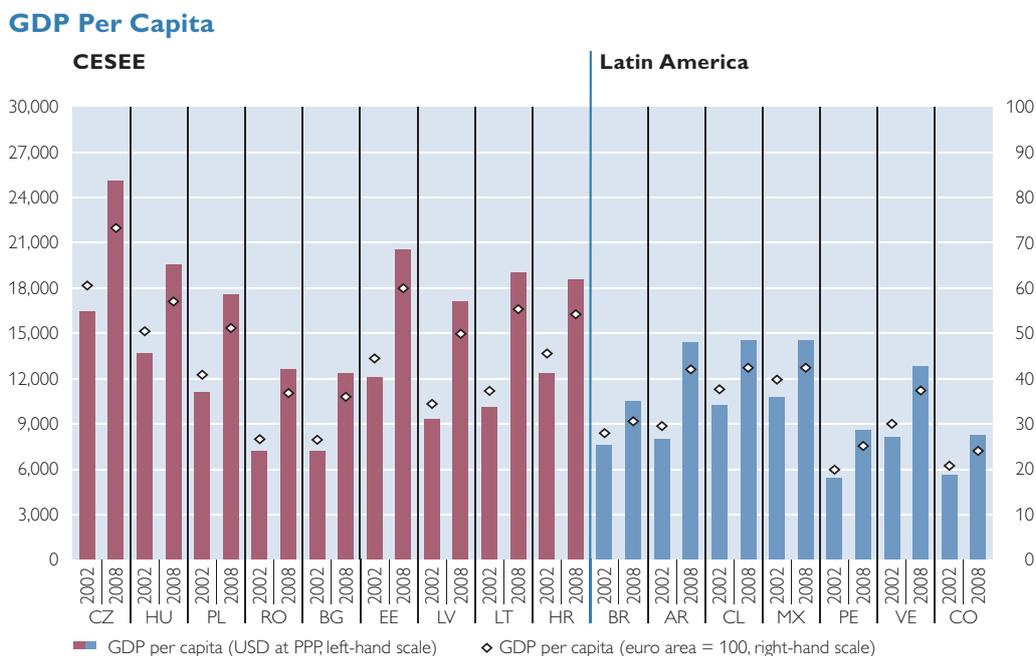
To set the stage, it is expedient to recall some key features that characterize CESEE and Latin America and are important for analyzing the impact of the global crisis on these two regions.

First, CESEE and Latin America display some differences in income levels. GDP per capita in 2008 reached on average USD 18,000 at PPP in CESEE, while it was USD 12,000 in Latin America. These levels correspond to slightly over 50% and about 35%, respectively, of the euro area average (see chart 1). In terms of total GDP, Latin America is three times as large as the CESEE countries covered in this study, given that it has an overall population of 460 million, which compares with 100 million in the CESEE region.

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² In this study, the CESEE region covers nine countries: the eight CESEE EU Member States which have not yet adopted the euro (i.e. Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and Romania) as well as Croatia. Latin America comprises the seven largest economies of the region (i.e. Argentina, Brazil, Chile, Colombia, Peru, Mexico and Venezuela).

Chart 1

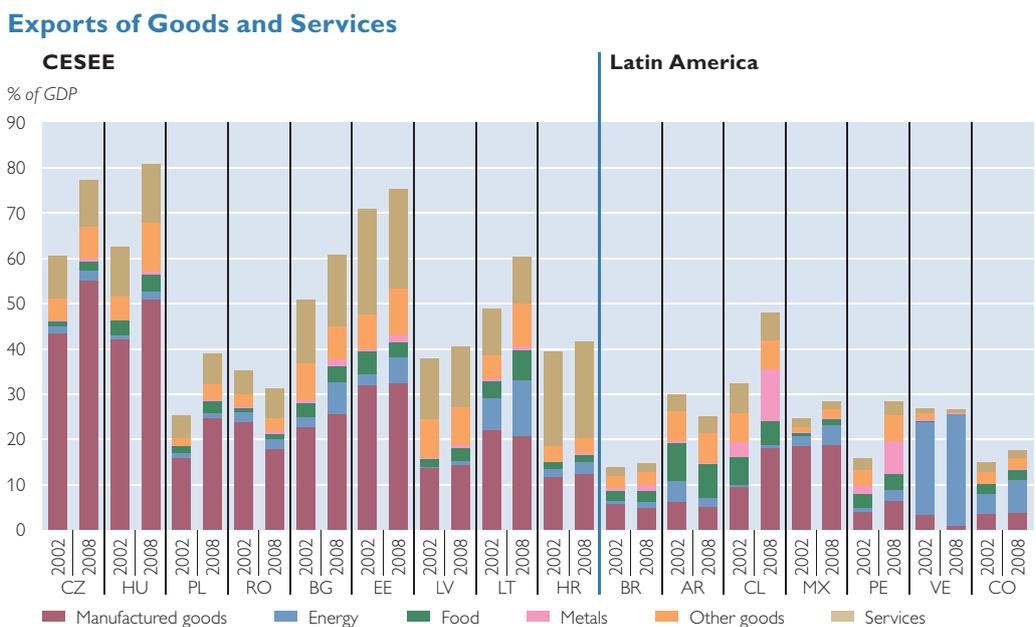


Source: IMF WEO database, OeNB, Banco de España.

Second, the two regions also vary as to their degree of trade openness. On average, in CESEE, exports of goods and services amount to some 50% of GDP, compared with 23% of GDP in Latin America (chart 2).

Moreover, as chart 2 shows, export structures differ, too. In CESEE, some three quarters of total exports consist on average of manufactured goods, while

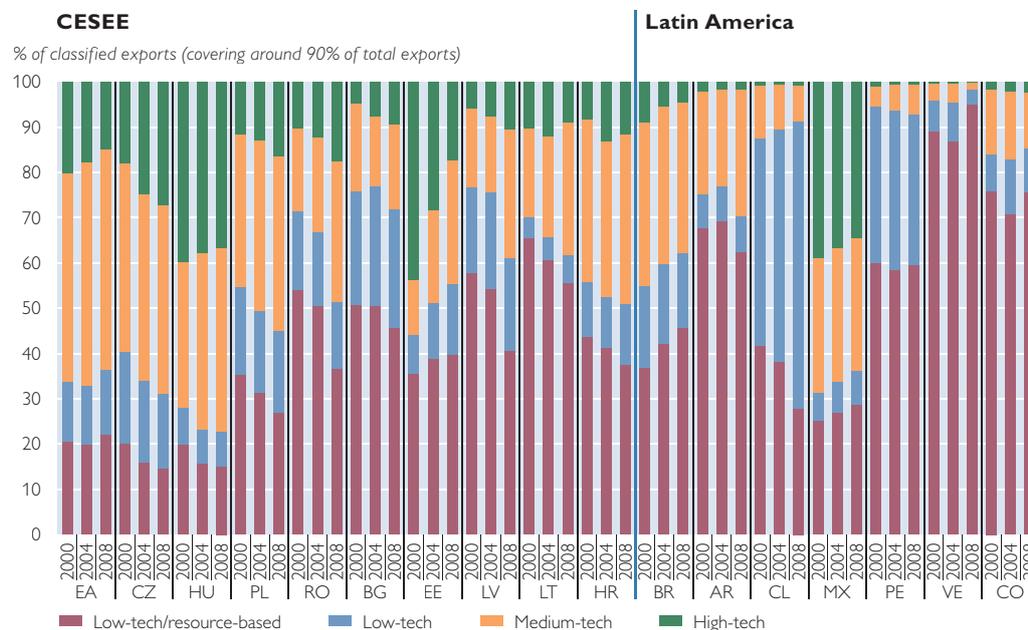
Chart 2



Source: National central banks, OeNB, Banco de España.

Chart 3

Technological Content of Exports



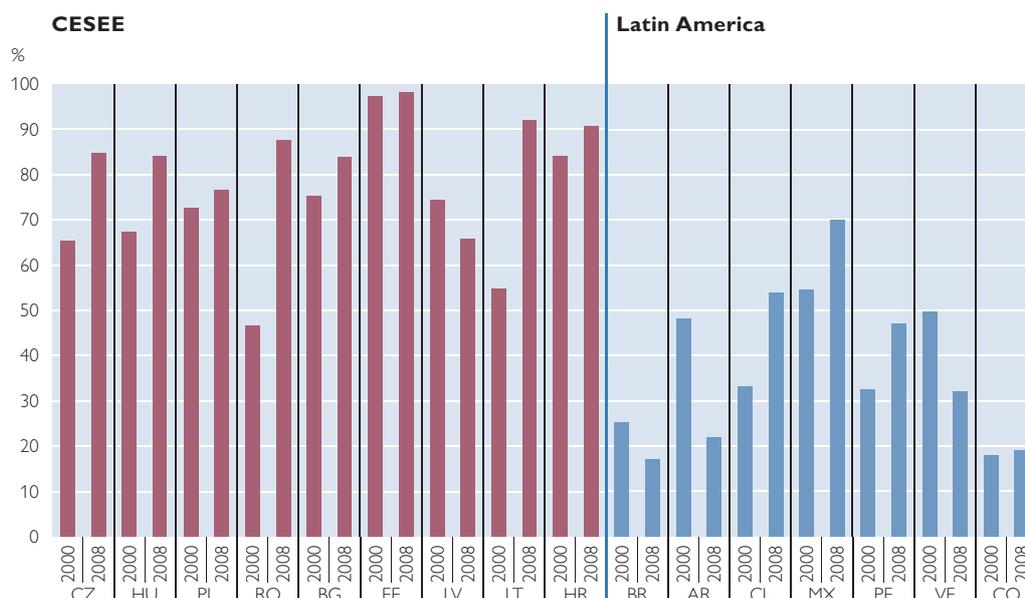
Source: Eurostat COMEXT database, UN Comtrade database, OeNB.

Note: EA = euro area.

less than 15% are commodities. In Latin America, the respective shares are on average 43% and 41%. The technological content of exports confirms this picture (chart 3).

Chart 4

Share of Foreign Banks in Total Banking Assets



Source: EBRD, BIS, IMF, OeNB, Banco de España.

Third, the two regions exhibit some differences as regards financial integration. This is particularly true for the integration into international banking networks. The share of foreign banks in total banking assets averages 82% in CESEE, as opposed to 37% in Latin America (chart 4).

Finally, the two regions differ with respect to institutional integration (perspectives): The CESEE countries reviewed here are already, or will soon become, members of the European Union, while Latin America does not have such a focal point to anchor economic and social development.

Moreover, neither region is uniform, but the degree of heterogeneity is more pronounced across the CESEE region. While we can learn much from comparisons among the two regions, it is also important not to lose sight of intraregional variation. This is particularly true for the macrofinancial risk profile, which has, apart from regional factors, very strong country-specific dimensions.

2 The Boom Years before the Crisis

In the run-up to the global crisis, both regions were experiencing booming economic conditions, with buoyant GDP and credit growth largely driven by sizeable capital inflows. These booms were underpinned by strong world growth, easy global liquidity conditions and a positive growth outlook. As a consequence, average annual GDP growth reached 5% in the CESEE region and 4.3% in Latin America between 2002 and 2008. Economic growth in both regions was led by domestic demand (private consumption and investment), which in some countries displayed clear signs of overheating toward the end of the boom years. At the same time, net exports contributed negatively to GDP growth during the 2002 to 2008 period, in particular in the CESEE countries (−1.6% per annum on average in CESEE, however with very wide cross-country variation, and −0.8% in Latin America). As a consequence of the 2002 to 2008 growth period, living standards in both regions increased significantly and poverty rates – starting from a much higher level in Latin America – decreased.

Aside from favorable global conditions, several region-specific features had likewise underpinned the strong growth momentum before the outbreak of the global crisis. As for the CESEE countries, two aspects in particular distinguish them from other emerging market economies. First, CESEE countries underwent a deep and historically unprecedented transformation from planned to market economies. This implied significant investment needs, as the pre-transition physical capital stock had become largely obsolete. In addition, economic transformation went hand in hand with a rapid change in economic integration patterns. The regional reorientation of trade flows to the EU was accompanied and in fact promoted by a shift from resource-based/low-tech exports to medium- and high-tech exports. This helped CESEE countries to successfully cope with the negative terms-of-trade shock resulting from the global commodity price boom before the crisis. At the same time, the financial integration of CESEE countries with advanced European economies also deepened substantially, not least in terms of cross-border ownership of financial institutions. While financial integration has been a key driver of growth in CESEE, it has also contributed to credit booms,³ elevated leverage and a buildup of foreign currency loans (EBRD, 2009).

³ For more details, see Backé, Égert and Walko (2007) and Zumer, Égert and Backé (2009).

The reorientation of trade and financial links is closely related to the second key distinguishing aspect of CESEE economies, namely their participation in the EU integration process. Except for Croatia – which is expected to join the EU in the next few years – all CESEE countries covered here have become members of the EU, a highly integrated economic area, and have adopted European standards for economic policy, institutions and governance. Undoubtedly, this has anchored and promoted economic development in the CESEE region (even though the advent of EU membership may also have contributed to overly optimistic expectations during the boom years before the crisis). Moreover, all CESEE countries are sooner or later set to adopt the euro and are thus committed to striving toward the fulfillment of the convergence criteria laid down in the Treaty (ECB, 2003).

During the period of buoyant growth lasting until 2008, financial vulnerabilities built up in some CESEE countries. Policy stances differed across countries, while the policy toolbox (e.g. as regards the management of capital flows) was constrained by EU accession and the depth of financial integration. In most CESEE countries, substantial capital inflows and fast credit growth were largely seen as both manageable and supportive to the catching-up process, while downside risks were perceived as being contained. Measures to dampen credit growth were taken in a number of countries, but – with the exception of Croatia – the effects were relatively moderate and temporary.

Latin America was enjoying, during the five-year period running up to 2008, its longest and most dynamic growth spell since the 1970s, having left behind the financial crises that had affected some countries in the late 1990s and early 2000s. A key driver for this performance was the commodity price rally that took place during this period and which meant an accumulated positive terms-of-trade shock for this commodity exporting region of more than 150%.

A second key factor is the outstanding reduction in financial vulnerabilities that was achieved in the period from 2002 to 2008 on the back of improved economic policy management in most countries, though not all. Learning from past crises and policy mistakes, most countries in Latin America pursued sounder monetary and fiscal policies, adopted more flexible (though still managed) exchange rate regimes, and paid substantial policy and regulatory attention to signs of excessive capital inflows, asset price bubbles, currency mismatches and credit booms during the years before the crisis. Such attention arguably moderated the risk of a boom-bust cycle.

3 Vulnerabilities at the Onset of the Global Crisis: Mixed Patterns, Especially in CESEE

To capture the macrofinancial strengths and vulnerabilities of CESEE and Latin America before the global crisis, we employ a broad list of standard vulnerability indicators, which are presented in the form of cobwebs. This allows for a comparison across indicators and time and thus for capturing risk profiles at the onset of the current and earlier crises.⁴

⁴ The methodology used allows only for an indirect comparison across regions, as the cobweb charts depict the deviations of each indicator from a long-term average of the respective region.

Clearly, these averages are not necessarily indicative of the vulnerability profile of individual countries.⁵ It is also important to note that the link between vulnerabilities and performance during crisis periods is neither simple nor straightforward. In fact, empirical evidence from earlier crisis episodes is not conclusive on how, when and to what extent vulnerabilities materialize when a shock hits.

More specifically, we employ six sets of indicators related to (1) market sentiment, (2) the real economy, (3) the public sector, (4) monetary factors, (5) the external sector and (6) the banking sector. Table A1 in the annex contains the full list of indicators and also refers to the underlying motivation for their inclusion into our data set. For the current crisis, we use data as of September 2008 (Lehman collapse), given that the crisis spread to emerging countries mostly after this event. The reference points for comparisons across time are December 2001 (Argentine crisis) and August 1998 (Russian crisis).⁶

The cobweb charts are to be read in the following way: The closer a data point is located to the origin of the cobweb, the lower is the degree of vulnerability, and vice versa. Data are normalized based on their long-term average and the standard deviation of the series.⁷ The impact of possible trends in the data, which could result from factors like structural reforms or integration, is not accounted for, as there is no obvious method to filter out possible trend components in a robust and incontestable way. At any rate, this caveat calls for caution in the interpretation of the data.

The general message conveyed by these cobwebs (see chart 5) is that Latin America succeeded in considerably reducing vulnerabilities in the years before the current crisis, not only in the banking sector (where the recent turmoil started), but also in the public and external sectors, which had been at the origin of past crises in the region. Economic policies played an important role in containing financial vulnerabilities in Latin America prior to the crisis, in particular reserve accumulation and measures to discourage short-term capital inflows and financial dollarization. In the boom years before the outbreak of the global crisis, Latin America was running current account surpluses, and external debt as a share of GDP had shrunk substantially. So had currency mismatches, short-term debt as a share of international reserves was very low and the region had a positive net foreign asset position. Thus, one can argue that Latin America was better prepared than in the past to weather external shocks, when the most recent financial crisis struck.

In turn, vulnerabilities in the CESEE region as a whole had increased in some areas in the years prior to the current crisis, notably in the external and banking sectors and with respect to some monetary indicators (mainly credit develop-

⁵ Regional aggregates are based on weighted averages of country GDPs in PPP terms. Cobwebs for individual CESEE countries are available upon request from the OeNB authors of this paper. Sectoral aggregates refer to arithmetic averages of all subindicators used.

⁶ In the case of daily and monthly (quarterly) data, we use the weighted average of the six months (four quarters) before the month (quarter) of the respective crisis. Regional aggregates are based on weighted averages of country GDPs in PPP terms. Sectoral aggregates refer to arithmetic averages of all subindicators used.

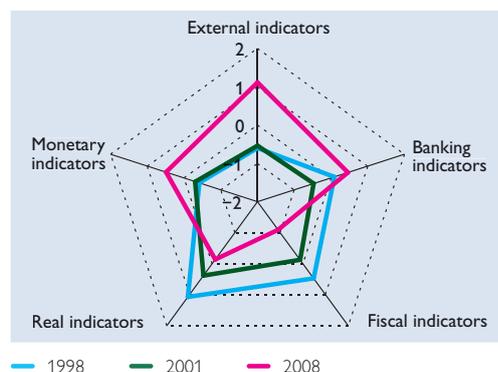
⁷ A value above zero means a positive deviation from the long-term average expressed in standard deviations. In order to ensure that a cobweb closer to the origin represents less vulnerability, some variables are inverted (sovereign ratings, domestic stock index, budget balance, deposit growth, industrial output growth, current account balance, FDI, net portfolio investment flows, net foreign assets, basic balance, return on equity, capital adequacy ratio, long-term foreign exchange deposit rating and relative bank stock price).

Chart 5

Vulnerability Indicators¹

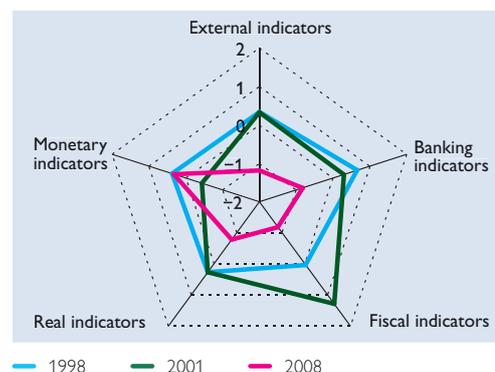
CESEE

measured in standard deviations from long-term averages



Latin America

measured in standard deviations from long-term averages



Source: National central banks, OeNB, Banco de España.

¹ Cobwebs on each of the six indicator groups and the respective subindicators are presented in the annex.

Note: Observations closer to the origin of the graph indicate lower vulnerability.

ments). By contrast, sentiment, fiscal and real indicators suggested a decline in the region's macrofinancial vulnerabilities over time. As mentioned earlier, though, the development of macrofinancial risk profiles was diverse across individual CESEE countries.

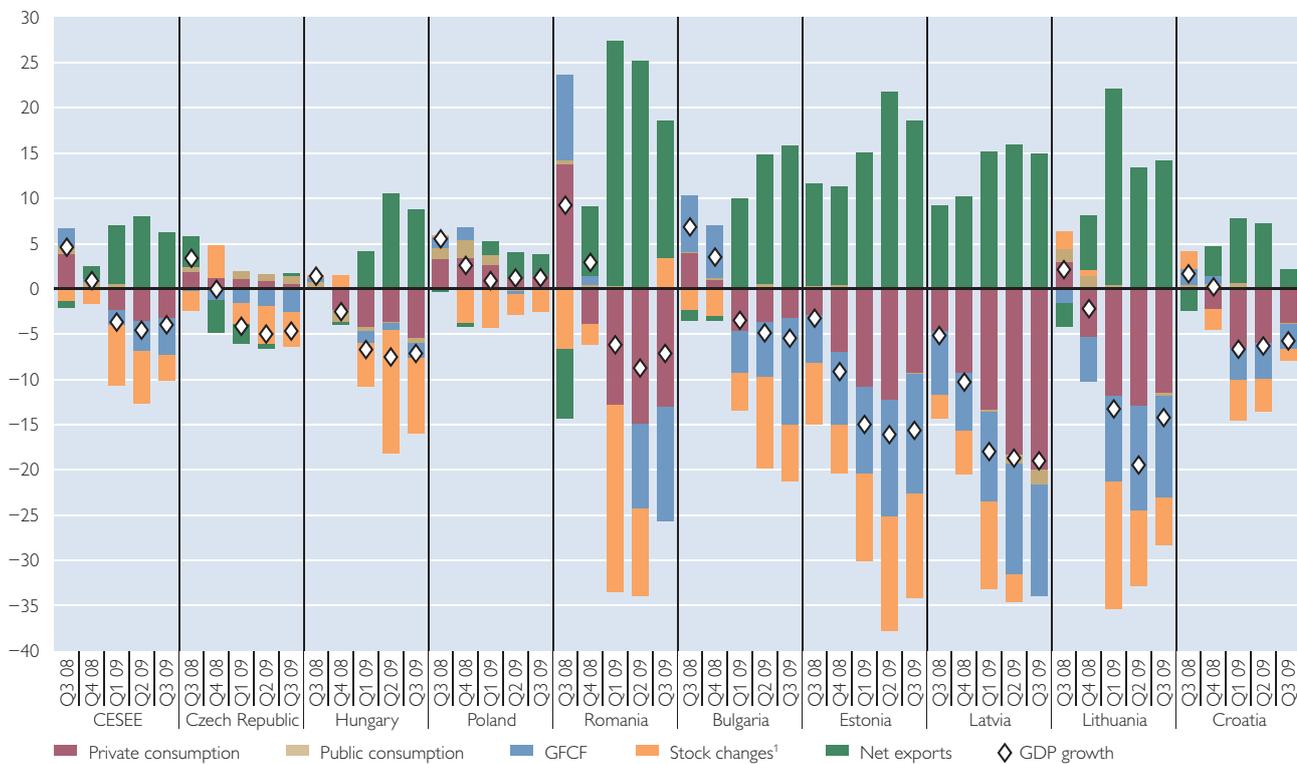
Complementing chart 5, the annex contains two tables which display the risk profiles in 2008 relative to the two earlier crisis episodes used as reference points (Argentine and Russian crises). Table A2 and A3 highlight where vulnerability indicators in 2008 deviated substantially from their long-term averages.

4 The Spillovers of the Global Financial Crisis: Both Regions Hard Hit, but Mitigating Factors at Work

Like other emerging markets, both CESEE and Latin America showed remarkable resilience against the global economic and financial crisis up to the collapse of Lehman Brothers in September 2008, quite independently of vulnerability profiles. Thereafter, both regions were severely hit by the crisis, as risk aversion – in particular vis-à-vis emerging markets – rose substantially and liquidity flowed into safe U.S. government bonds. This exerted substantial pressure on exchange rates in a number of countries. The crisis led to massive falls in asset prices, including stock prices, fixed income securities, and – in the case of some CESEE countries – also house prices. In parallel, world trade collapsed. As a consequence, exports of CESEE countries plummeted, which in turn led to a contraction in investment. As the prospect of a major downturn became ever more likely, confidence dropped and labor market conditions worsened, and private consumption also took a hit. As a consequence, year-on-year GDP growth moderated substantially in the last quarter of 2008 and turned negative in most countries (apart from Poland) in the first three quarters of 2009. Also, the composition of growth changed: The contribution of net exports turned positive, as imports contracted much more strongly

GDP Growth and Its Components in CESEE

GDP growth: year-on-year change in %; components: contribution to annual growth in percentage points



Source: Eurostat, OeNB.

¹ Including statistical discrepancy.

than exports (see chart 6). In Latin America, the real economy repercussions were similar, but overall not as stark as in the CESEE region (see chart 7).

At that stage, developments across countries became more differentiated. Country-specific risk profiles (including debt levels, reliance on foreign funding and the presence of large currency mismatches) started to play a more important role in determining the course of events, while the degree of trade openness also played a major role, given the severity of the trade shock.

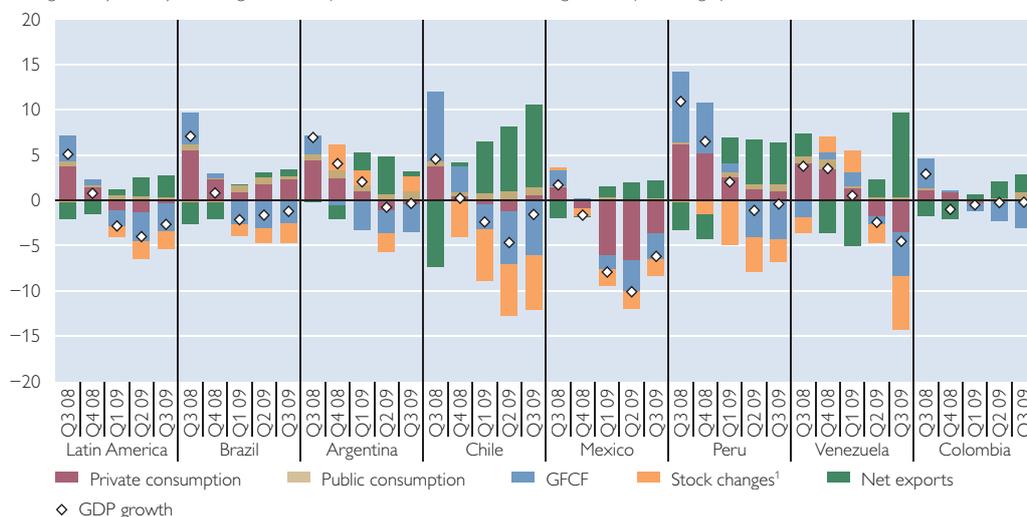
The transmission of the crisis peaked in early 2009. More recently, CESEE and Latin America saw a recovery of equity markets, an appreciation of exchange rates and a fall in risk premiums. Financial markets in most Latin American countries recovered to pre-crisis levels or even beyond, but in CESEE – except for risk premiums – financial markets have still not reached their pre-Lehman levels. Exports also stabilized and, more recently, saw a moderate pickup again.

Overall, the real economic downturn in 2009 was more pronounced in the CESEE region as a whole than in Latin America. This can be attributed to the much higher export-to-GDP ratios and the substantially higher share of manufactured goods in the exports of CESEE countries compared to Latin American countries, but also to the financial vulnerabilities of a number of CESEE countries. Indeed, they experienced much larger adjustments during the crisis than Latin America. As a notable exception in CESEE, Poland continued to record pos-

Chart 7

GDP Growth and Its Components in Latin America

GDP growth: year-on-year change in %; components: contribution to annual growth in percentage points



Source: National statistical offices, OeNB, Banco de España.

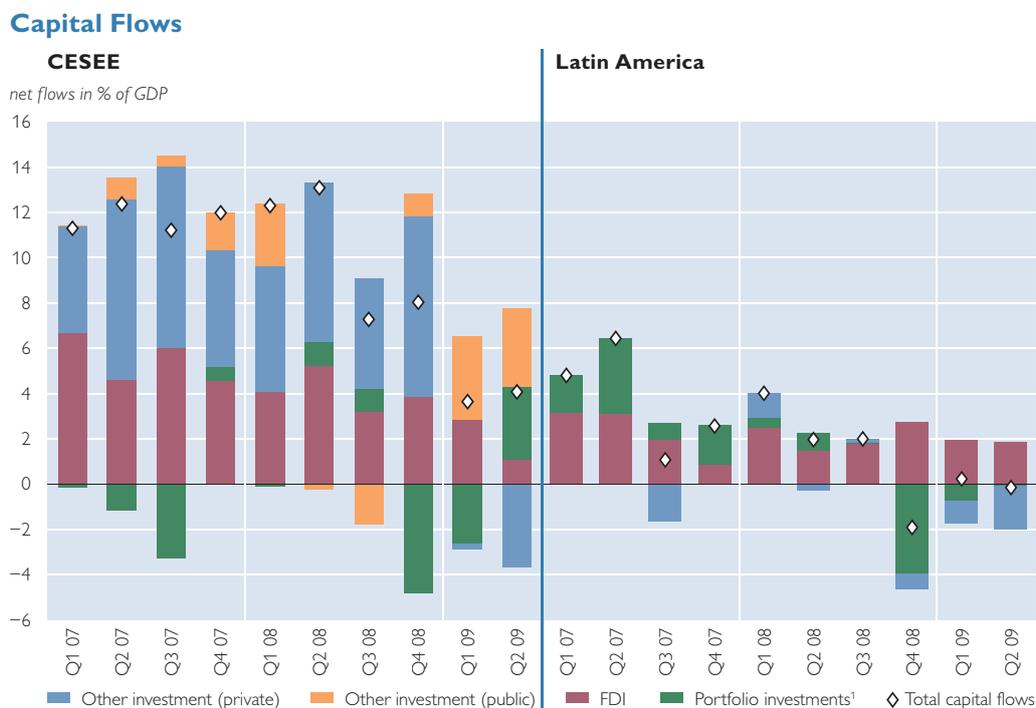
¹ Including statistical discrepancy.

itive economic growth in 2009. This can be traced back to (1) fairly low initial vulnerability levels, (2) a comparatively low degree of export dependence, (3) a strong (but partly temporary) fall in the exchange rate (which contained imports), (4) some fiscal stimulus and (5) infrastructure investment, which was partly financed by the EU and partly driven by preparations for the European Soccer Championship 2012.

While total capital inflows moderated much more for the CESEE region than for Latin America, given the higher inflows into emerging Europe before the crisis, total inflows into CESEE remained in positive territory in the final quarter of 2008 and the first half of 2009. By contrast, Latin America recorded net outflows in the last quarter of 2008 and about zero net inflows in the first half of 2009 (chart 8).

Without other (public) investment, which includes IFI/EU financial assistance, net flows to CESEE were positive in the final quarter of 2008, about zero in the first quarter of 2009, and again marginally positive in the second quarter of 2009. However, for some CESEE countries, private financial flows were not enough to meet the financing needs in the last quarter of 2008. In CESEE, the financing gap was covered with international reserves and, in some countries, by having recourse to IFI/EU credit. This is an important difference with Latin American countries, where financing needs were covered with international reserves.

For three CESEE countries (Hungary, Latvia, Romania), IFI/EU support packages were in fact instrumental in stabilizing their economies and in sustaining private capital flows. IFI/EU programs for Hungary and Latvia might have helped support private flows to other CESEE countries, although there is no direct evidence underpinning such spillover effects. In any case, private capital flows to CESEE started to recover from March 2009 onwards, when it became clear that IMF resources as well as EU balance of payments support facilities for EU Member



Source: National central banks, OeNB, Banco de España.

¹ Including financial derivatives.

States would be increased substantially. In turn, Latin America did not have to resort to international support measures to cover balance of payments needs. However, Brazil and Mexico concluded a currency swap agreement with the Federal Reserve (similar to those of some developed countries), and two countries (Mexico and Colombia) signed up for the IMF's new Flexible Credit Line as a precautionary measure, and so did Poland.

In CESEE, a key factor in sustaining overall capital flow dynamics was that intragroup loans of banks remained stable or even expanded (Mihaljek, 2009; EBRD, 2009; Berglöf et al., 2009). In Latin America, in turn, foreign bank funding was generally much less relevant as a source of finance, since most credit was financed by the local deposit base.

More recently, capital flows started to show signs of improvement and the worst case scenario of a fully-fledged financial meltdown occurred neither in the CESEE region nor in Latin America.

As a consequence of the crisis, credit and deposit growth has moderated substantially and banks in both regions are now confronted with increasing nonperforming loans (comparatively more pronounced in some CESEE countries than in Latin America)⁸ as well as declining profitability. Yet, bank capitalization has remained at high levels in all countries under review, providing a buffer against a potential further deterioration in asset quality.

⁸ Due to differences in classification rules, the comparability of nonperforming loan levels across countries is, however, limited.

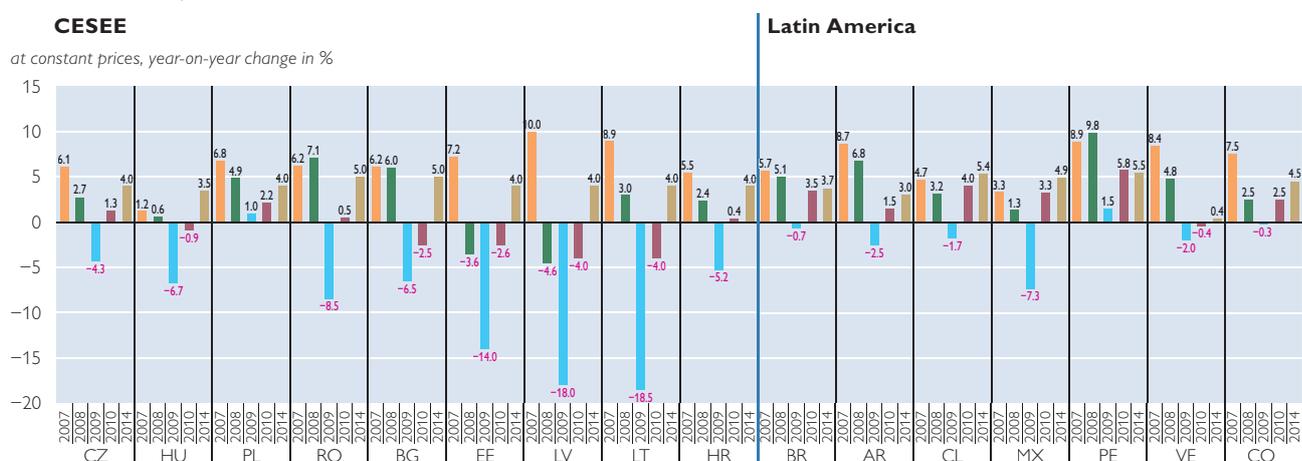
5 Policy Response: Stabilizing Role of National and International Support Measures

As the crisis affected both regions, the policy response focused on standard and nonstandard central bank policy actions as well as on fiscal measures. At the end of 2008, when the severity of the downturn became clear and the risks of inflation from exchange rate pass-through seemed limited, most countries started a process of monetary easing. Nevertheless, in almost all countries, policy rates remained at higher levels than in major industrialized economies. On a positive note, neither Latin American countries nor most CESEE countries (except for Hungary) had to hike interest rates to defend exchange rates. Since the outbreak of the crisis, the authorities in both regions, as elsewhere around the globe, have taken a range of extraordinary policy measures to stabilize financial systems and to reduce spillovers to the real economy.⁹ Fiscal policy responses to the crisis varied within and across the two regions and were mainly determined by the fiscal situation at the beginning of the crisis. Only some CESEE countries were in a position to run – rather moderate – countercyclical fiscal policies, while others had to engage in procyclical tightening to retain or regain investor confidence. In contrast, relatively sound fiscal positions prior to the crisis allowed most Latin American governments to respond to the global crisis with – at least moderately – countercyclical fiscal policy. The implementation of the fiscal policy plans has, however, fallen behind schedule in most countries. Moreover, as previously stated, international support measures from the IMF and the EU were instrumental in restoring confidence and so was the increased role of emerging economies in the international policy discussions, notably in the G-20.

Even though the economic downturn seems to have reached a bottom, the pattern of economic recovery is still unclear. The growth outlook for Latin America has been revised upward in recent months, while it has recently stabilized for CESEE at relatively low levels for 2009 and improved somewhat for 2010. Accord-

Chart 9

GDP Growth, 2007–2014



Source: IMF WEO database, OeNB, Banco de España.

⁹ For a more detailed account of the measures taken by Latin American central banks, see Banco de España (2009).

ing to current projections, Latin America enjoys, on average, better growth prospects for 2010 due to a relatively sound fiscal, external and financial position, less intense financial distress and commodity price increases, while growth projections (subject to much uncertainty) for the next four years appear to be broadly similar for both regions (see chart 9). A weak growth outlook in the United States and the euro area, a further deterioration of bank asset quality, swings in risk appetite which may lead to either downward or upward pressures on exchange rates, fiscal imbalances as well as a series of upcoming elections may, however, represent risks to economic recovery for the countries in CESEE and Latin America. In the latter region, increased political pressure on central banks may also be a risk factor.

6 Concluding Remarks

The two regions under review – Central, Eastern and Southeastern Europe and Latin America – exhibited important differences in macrofinancial vulnerabilities at the start of the crisis. This subsequently had an impact on the extent to which the two regions were affected by the international economic and financial turmoil. By and large, Latin America was hit by the crisis at a time when it had made considerable progress in reducing macrofinancial vulnerabilities, while vulnerabilities in the CESEE region as a whole had increased in some respects prior to the crisis. Moreover, cross-country variation has been considerable in the two regions. Particularly in CESEE, countries displayed substantial differences in macrofinancial risk profiles. As some of these risks materialized after the fall of Lehman Brothers, performance also became more differentiated.

Moreover, during the crisis, integration into European banking networks turned out to be an asset (it certainly had also contributed to boosting the boom before the crisis).¹⁰ While financial vulnerabilities played a key transmission role in several CESEE countries, their high dependence on the export of manufactured goods resulted in a particularly strong impact of the trade channel, when world trade and export demand collapsed in late 2008. The trade channel affected Latin America mostly through the drop in commodity prices and in export demand, whereas the financial distress was intense but had a more limited impact due to reduced vulnerabilities and timely policy responses.

The EU anchor has likewise proved very beneficial for CESEE countries, as it provides a functioning institutional and regulatory framework that promotes the convergence process and is expected to prevent extreme policy slippages. Latin America, in turn, has benefited from policies that had reduced its vulnerabilities prior to the crisis and after the onset of the crisis (contrary to past experiences) became countercyclical. Given their less clearly anchored convergence process and possibly also slower productivity gains, Latin American countries may need to make additional efforts to consolidate macroeconomic and financial stability in the years to come.

¹⁰ See also Berglöf *et al.* (2009), EBRD (2009), ECB (2009) as well as Herrmann and Mihaljek (2010).

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Annex

Table A1

Sentiment and Vulnerability Indicators

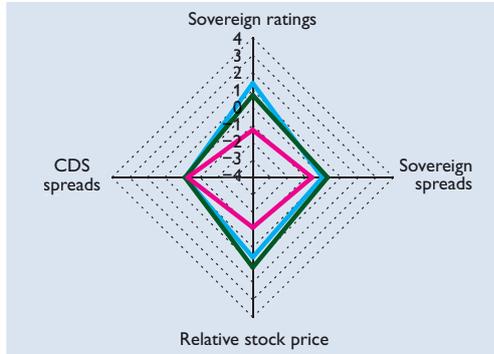
Group	Indicator	Interpretation
Sentiment indicators	EMBI spreads CDS sovereign spreads Sovereign rating (average of Fitch, Moody's and S&P) Relative stock exchange index (to world index)	Proxies for market and international investor sentiment, which also gauge potential contagion effects from a global or emerging market crisis
Vulnerability indicators <i>of which:</i>		
External indicators	All	Measure of balance of payments pressures or the capacity and willingness of a country to deal with its external liabilities (ultimately including the possibility of sovereign default)
	Current account balance	Measure of external financing needs
	FDI and basic balance	Measure of which part of external financing needs is covered by long-term and relatively stable capital inflows
	Short-term debt over foreign exchange reserves	Estimate of the capacity to confront a sudden stop in short-term capital inflows or short-term debt rollovers with central bank resources
	External debt (and external debt service)	Capacity to repay external liabilities
	Net portfolio investment inflows	Measure of potential short-term outflows in case of a sudden stop
	Net foreign assets (NFA)	Structural measure of a country's position as external creditor or debtor and of the potential impact of a more pronounced depreciation of the currency
Banking indicators	All	Indicator of imbalances in an industry with high externalities over the rest of the economy
	Domestic banks' foreign liabilities over foreign assets	Proxy for currency mismatches in case of a devaluation and the dependence of banks on external sources of funds
	Long-term foreign exchange deposit rating (Moody's)	Measure of foreign investor sentiment about a country's banking sector
	Relative stock price index for domestic banks	Measure of investor confidence vis-à-vis listed banks relative to the rest of the stock exchange
	Loan-to-deposit ratio	Measure of whether credit is increasing faster than deposits and is financed through other – possibly less stable – sources
	Share of foreign currency loans in total loans	Measure of the currency mismatch of bank clients, and the potential increase in nonperforming loans in case of a strong depreciation
	Nonperforming loans (NPLs)	Gauge of the pressure from nonperforming loans on banking sector balances
	Capital adequacy ratio (CAR)	Indicator of the solvency of the banking sector
	Return on equity (ROE)	Indicator of the profitability of the banking sector
Fiscal indicators	Budget balance Public debt	Signal of pressures from public finances on monetary and exchange rate policies and indicator of financing pressures on the public sector
	Interest payments over budget revenues	Indicator of debt servicing pressures on public accounts and proxy for the sustainability of a certain debt level
Monetary indicators	Real M2 growth Real deposit growth Real credit growth	Measures meant to capture issues related to monetary policies, credit growth and the way it is financed
Real indicators	Industrial output growth	Leading indicator of current and future economic growth
	Nominal interest rates Consumer price inflation	Variables determining investment and consumption propensity
	Export growth	Proxy for external demand and international competitiveness

Source: Compiled by authors.

Chart A1

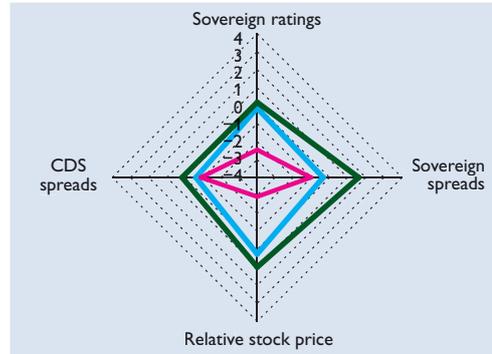
Sentiment Indicators

CESEE



— 1998 — 2001 — 2008

Latin America



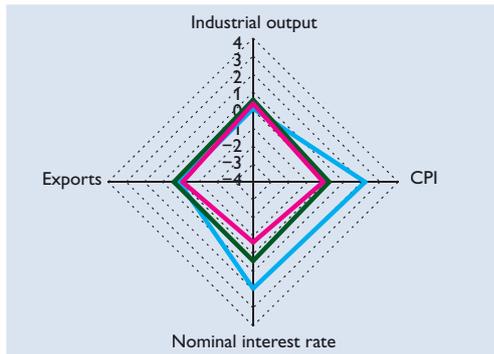
— 1998 — 2001 — 2008

Source: J.P.Morgan, Moody's, Fitch Ratings, Standard & Poor's, Thomson Reuters, OeNB, Banco de España.

Chart A2

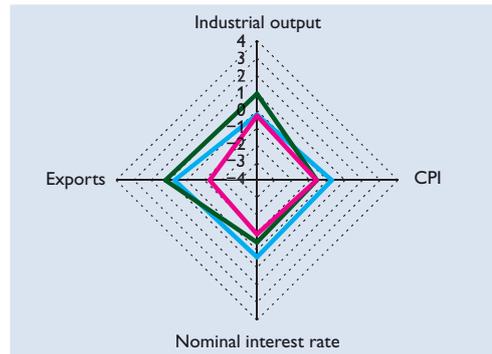
Real indicators

CESEE



— 1998 — 2001 — 2008

Latin America



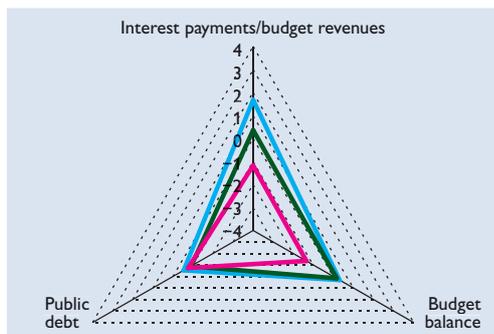
— 1998 — 2001 — 2008

Source: National central banks, OeNB, Banco de España.

Chart A3

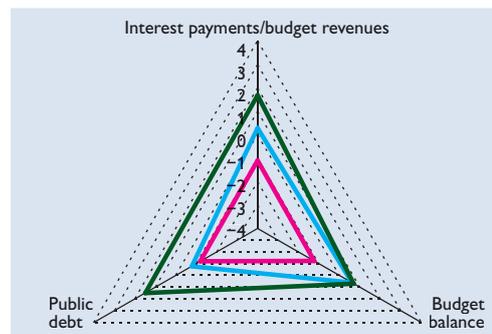
Fiscal Indicators

CESEE



— 1998 — 2001 — 2008

Latin America



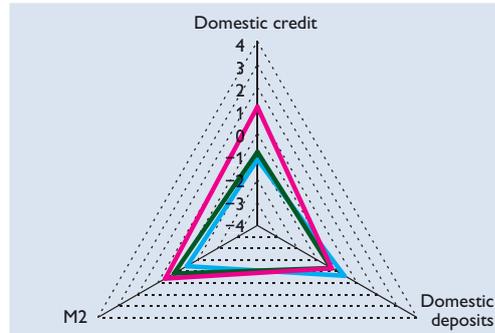
— 1998 — 2001 — 2008

Source: National central banks, OeNB, Banco de España.

Chart A4

Monetary Indicators

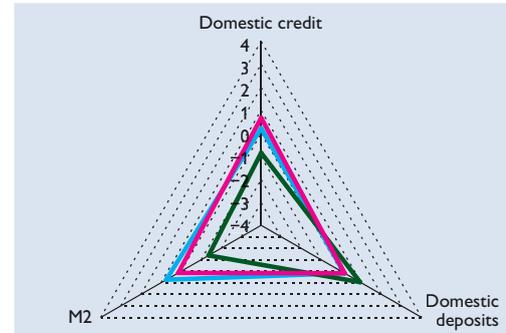
CESEE



— 1998 — 2001 — 2008

Source: National central banks, OeNB, Banco de España.

Latin America

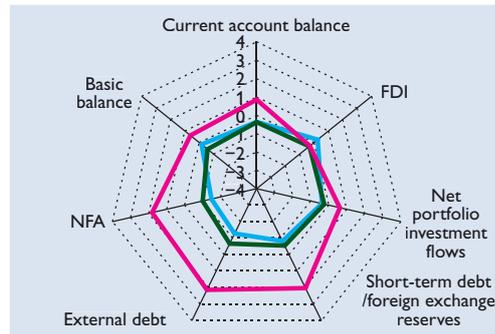


— 1998 — 2001 — 2008

Chart A5

External Indicators

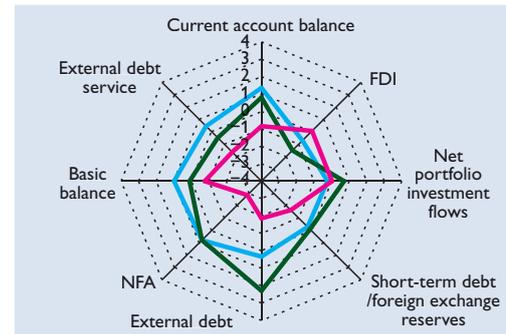
CESEE



— 1998 — 2001 — 2008

Source: National central banks, OeNB, Banco de España.

Latin America

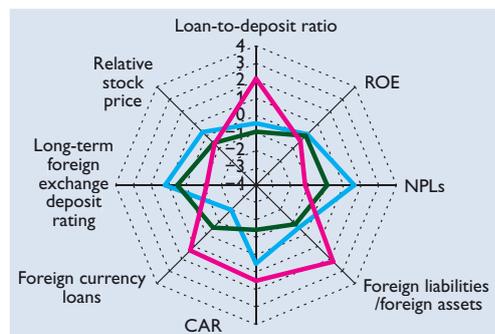


— 1998 — 2001 — 2008

Chart A6

Banking Indicators

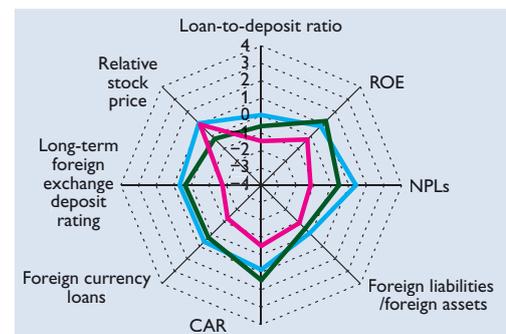
CESEE



— 1998 — 2001 — 2008

Source: National central banks, OeNB, Banco de España.

Latin America



— 1998 — 2001 — 2008

Table A2

Vulnerabilities vis-à-vis Previous Crisis Episodes

Group	Indicator	CESEE	Latin America
Sentiment indicators	EMBI spreads	+	+
	CDS sovereign spreads	+	+
	Sovereign rating (average of Fitch, Moody's and S&P)	+	+
	Relative stock exchange index (to world index)	+	+
External indicators	Current account balance	-	+
	FDI	0	-
	Basic balance	-	+
	Short-term debt over foreign exchange reserves	-	+
	External debt (and external debt service)	-	+
	Net portfolio investment inflows	-	0
	Net foreign assets (NFA)	-	+
Banking indicators	Domestic banks' foreign liabilities over foreign assets	-	+
	Long-term foreign exchange deposit rating (Moody's)	+	+
	Relative stock price index for domestic banks	0	0
	Loan-to-deposit ratio	-	+
	Share of foreign currency loans in total loans	-	+
	Nonperforming loans (NPLs)	+	+
	Capital adequacy ratio (CAR)	-	+
	Return on equity (RoE)	+	+
Fiscal indicators	Budget balance	+	+
	Public debt	0	+
	Interest payments over budget revenues	+	+
Monetary indicators	Real M2 growth	-	0
	Real deposit growth	0	0
	Real credit growth	-	-
Real indicators	Industrial output growth	0	+
	Nominal interest rates	+	+
	Consumer price inflation	+	+
	Export growth	+	+
Summary	Number of indicators improving compared with earlier crisis episodes	12	23
	Number of indicators deteriorating compared with earlier crisis episodes	12	2
	Number of indicators in line with earlier crisis episodes	5	4

Source: Compiled by authors.

Note: + / - = improvement / deterioration in 2008 vis-à-vis the two previous crisis episodes used as reference points (Argentine and Russian crises); 0 = similar to previous crisis episodes.

Table A3

Deviations from the Long-Term Average

Group	Indicator	CESEE	Latin America
Sentiment indicators	EMBI spreads	0	+
	CDS sovereign spreads	0	0
	Sovereign rating (average of Fitch, Moody's and S&P)	+	+
	Relative stock exchange index (to world index)	+	+
External indicators	Current account balance	0	0
	FDI	0	0
	Basic balance	0	0
	Short-term debt over foreign exchange reserves	-	+
	External debt (and external debt service)	-	+
	Net portfolio investment inflows	0	0
	Net foreign assets (NFA)	-	+
Banking indicators	Domestic banks' foreign liabilities over foreign assets	-	0
	Long-term foreign exchange deposit rating (Moody's)	+	+
	Relative stock price index for domestic banks	0	0
	Loan-to-deposit ratio	-	+
	Share of foreign currency loans in total loans	-	+
	Nonperforming loans (NPLs)	+	+
	Capital adequacy ratio (CAR)	-	0
	Return on equity (RoE)	0	0
Fiscal indicators	Budget balance	+	+
	Public debt	0	+
	Interest payments over budget revenues	+	+
Monetary indicators	Real M2 growth	0	0
	Real deposit growth	0	0
	Real credit growth	-	0
Real indicators	Industrial output growth	0	0
	Nominal interest rates	0	0
	Consumer price inflation	0	0
	Export growth	0	+
Summary	Number of indicators that are better (by at least 1 s.d.) than the long-term average	6	14
	Number of indicators that are worse (by at least 1 s.d.) than the long-term average	8	0
	Number of indicators that deviate by less than 1 s.d. from the long-term average	15	15

Source: Compiled by authors.

Note: + / - = deviation of indicator in 2008 from its long-term mean to the favorable (+) / unfavorable (-) side by more than 1 standard deviation (s.d.); 0 = deviation smaller than 1 s.d.

Trade, Economic Structure and the Great Recession: The Example of Central, Eastern and Southeastern Europe¹

As measured by the most recent monthly data, the trade collapse that had started in late 2008 has shifted into a rapid recovery phase. The simplest explanation that fits the facts is that trade has followed the sectoral composition of the recession. The recession has caused particularly strong declines of trade flows in heavy manufacturing, i.e. machinery, vehicles and related raw materials. This has translated into a deep manufacturing recession and an even stronger drop in trade. In particular, for CESEE countries these sectors are far more important in the composition of trade than they are in the composition of GDP.

Joseph F. Francois,
Julia Wörz²

JEL classification: F14, F15, O52

Keywords: trade collapse, industrial structure, Central, Eastern and Southeastern Europe

1 Introduction

The current recession has hit Central, Eastern and Southeastern Europe (CESEE) strongly, with the dramatic collapse in international trade playing a major role. Against that background, this short study sheds some light on recent trade developments of selected CESEE countries.

Chart 1 presents the pattern of OECD trade as the crisis unfolded, measured as three-month moving averages of import growth. Trade started to decline in May 2008 and turned negative in October 2008, when the collapse of Lehman Brothers and the consequent global reappraisal of risks compounded the global demand shock caused by falling U.S. demand. The trough in trade was reached in January 2009, yet positive import growth was not reached again before July 2009.

Mineral fuels, crude materials, manufactured goods and machinery and transport equipment experienced the most severe drops in trade. OECD imports in these categories showed record declines between 11% and 15% at the height of the trade collapse (from December 2008 to January 2009). In May 2009, when global trade volumes reached the trough, these categories were between 49% (mineral fuels) and 34% (machinery and transport equipment) below their previous levels in annual terms (see chart 1).

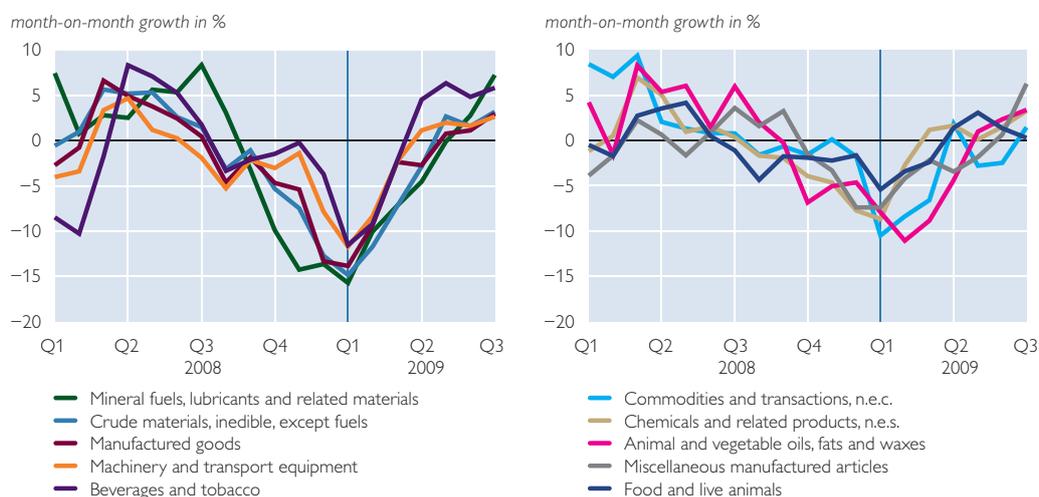
The trends in trade in late 2008, first spotted in early 2009, triggered consternation and raised intense discussions among academics, policy makers and businessmen alike. Through the summer of 2009, discussion ranged from worries about export credit shortfalls to resurgent import protection. The focus has been on finding the cause, and the assumption has been that the collapse in trade is unprecedented, inconsistent with the general level of economic downturn, and indicative of a trade-related set of problems calling for trade-specific solutions. As much as the collapse in trade has appeared to be exaggerated compared to changes in GDP, we can also expect to witness a rebound in trade which is greater than the

¹ This short analysis is based on the article “Follow the bouncing ball – trade and the great recession redux” by the authors in the Ebook “The Great Trade Collapse” edited by Richard Baldwin and published online on November 27, 2009, at <http://www.voxeu.org/index.php?q=node/4297>.

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Chart 1

OECD Import Growth by Product Categories, Based on 3-Month Moving Averages



Source: OECD.

corresponding recovery in GDP levels. The explanation behind this is that trade has followed the sector composition of the recession, i.e. countries more exposed in their production and trade patterns to durable consumption and investment goods were hit harder than countries with a different pattern of specialization.

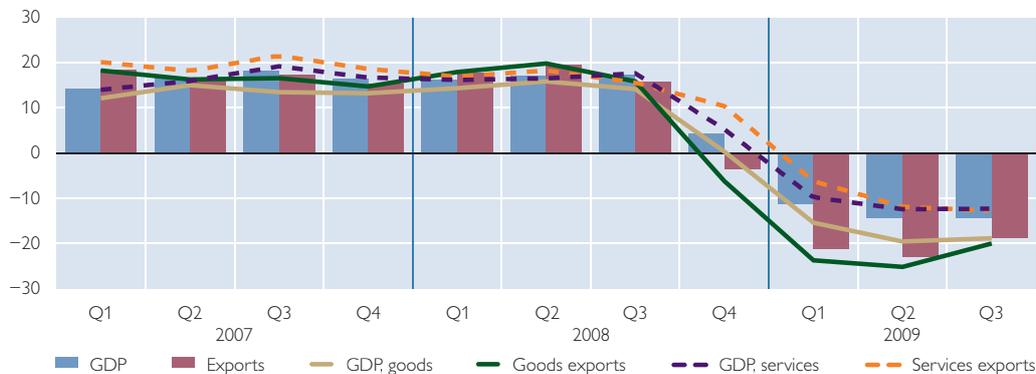
2 Recent Studies Focusing on the Composition Effect

In the emerging academic literature on trade and the crisis, the papers closest to the points we highlight here focus on the sector composition of the downturn and of trade. One set of explanations for the increased sensitivity of trade to GDP swings includes increased complexity in production. Freund (2009), for example, highlights fragmentation in production. She also notes that durable goods are most affected, historically, by financial downturns. This includes iron and steel. McKibbin and Stoeckel (2009) work with a computational general equilibrium (CGE) model modified to include elements of the financial crisis. They find that the drop in durables is much higher than for nondurables. In addition, the bursting of the housing bubble was identified as being most responsible for the drop in consumption and imports, while the change in the assessment of risk was largely responsible for the drop in investment. Also working with a CGE model, Bénassy-Quéré et al. (2009) emphasize that a large part of the recent drop in the level of trade is linked to price rather than volume effects (mostly related to the recent large decreases in oil and commodity prices). They also stress the importance of using appropriate price deflators. GDP price deflators can lead to substantial overestimating of trade volume changes in economic downturns. Willenbockel and Robinson (2009) also use a CGE model, focusing on developing countries and the collapse in global commodity prices as the downturn unfolded. Borchert and Mattoo (2009) focus instead on the relative stability of trade in the crisis. Indeed, in the case of India, the relative service intensity of India's trade profile served to dampen swings in total trade during the crisis.

Chart 2

CESEE EU Member States: GDP and Exports

annual change in %, current prices



Source: Eurostat.

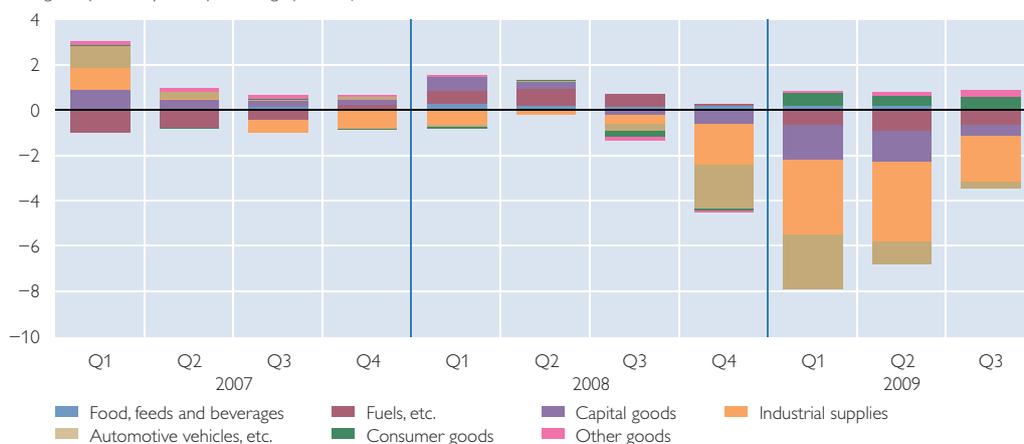
3 The Sectoral Pattern of the Recession

Chart 2 presents a quarterly breakdown of GDP and export trends as the recession unfolded in the ten CESEE EU Members States³ in 2008 and early 2009. For the region, GDP was down at an annual rate of 11.4% in the first quarter of 2009, while exports fell by 21.2% at an annual rate. This raises the issue of the composition of the fall in CESEE GDP. Production of goods was down at an annualized 15.5% in the first quarter of 2009. Services production, on the other hand, fell at an annualized 9.8% in the first quarter of 2009. Correspondingly, according to balance of payments data, exports of goods were down a striking 23.8%

Chart 3

Absolute Change in Exports by End-Use Categories in the CESEE EU Member States

change on previous year in percentage points of GDP



Source: Eurostat.

Note: Nominal exports divided by GDP.

³ Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia.

in the first quarter of 2009, while services exports decreased by only 6.3% (see chart 2).

To better understand what has been happening to total trade flows in goods, we now turn to a more detailed discussion of the sector composition of production and trade. Chart 3 presents the year-on-year change in CESEE Member States' goods exports by major end-use category.⁴

As is evident from chart 3, investment and durable goods as well as industrial supplies accounted for the lion's share of the overall drop. Indeed, in the fourth quarter of 2008, motor vehicles alone accounted for one-third of the total decline. In the first two quarters of 2009, industrial supplies accounted for about 40% of the decline. Basically, the recession has been hardest on heavy manufacturing, i.e. machinery, vehicles and related raw materials. This has translated into a deep manufacturing recession, and a correspondingly pronounced drop in trade.

4 Structural Differences between Production and Trade

An important point to keep in mind is that manufacturing has a much greater weight in total trade values than it does in domestic GDP. While this is obviously true for the OECD countries, it also holds for major emerging and developing economies and the CESEE countries as well. This is illustrated in chart 4 below.

In chart 4, we present a breakdown of EU patterns of production and trade by major sector, separately for the EU-15 (the countries that joined the EU prior to 2004) and the CESEE EU members (in this chart, excluding Bulgaria and Romania for reasons of data availability) in 2005.⁵ The first column presents GDP shares, while the second and third columns present export and import shares. 66% of total value added in the EU-15 is in services, while these activities account for only 17% of exports and 22% of imports. Manufacturing (inclusive of transport equipment) dominates both exports (81%) and imports (75%), yet is only 30% of domestic value added. Indeed, a great deal of domestic value added is in sectors that, on a gross value basis, contribute relatively little to the external accounts. The following figures refer to the CESEE EU Member States: 48% of total value added is in services, while only 10% of exports and 13% of imports are services. In contrast, 88% of exports are manufactured goods (85% of imports) and as much as 43% of domestic value added is in manufacturing.

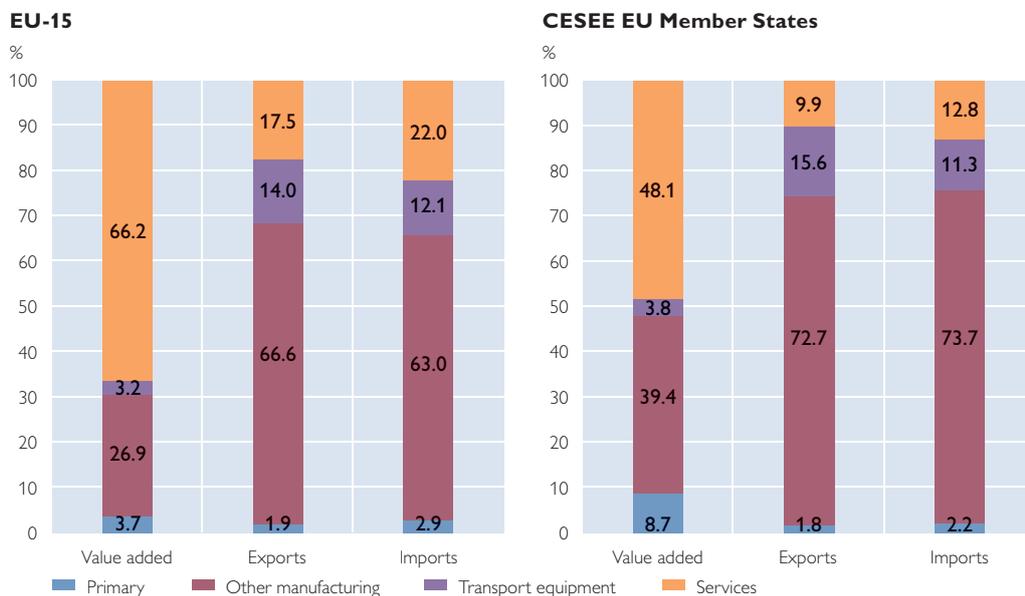
Such patterns mean that a global recession that hits industrial goods sectors the hardest will also have a disproportionate impact on trade relative to GDP. In addition, for countries where for historical reasons value added is concentrated in industrial supply and machinery sectors (like in much of CESEE), the impact of the recession on GDP must be greater than in more service-based economies. As a consequence, the CESEE EU Members States are particularly strongly exposed to trade shocks and thus affected during the current recession, which has been to a considerable extent associated with the collapse in world trade.

⁴ Due to the lack of real data, we divided nominal export flows by GDP in order to eliminate the effect of exchange rate fluctuations and similar price effects.

⁵ This is based on the EU KLEMS database, which is unique in combining trade and production data for services and goods, albeit at the cost of being already outdated to some extent. However, economic structures do not change too rapidly, therefore we chose to use these data despite this shortcoming.

Chart 4

Structure of GDP and Trade in 2005



Source: EU KLEMS database (Timmer et al., 2007).

5 Concluding Remarks

There are potentially important public policy questions lurking behind the trade-recession linkages. Has the recession been compounded by a set of trade-specific problems and issues? If so, how big are these, and should we be worried? In confronting these questions, we need to be careful when comparing real and nominal changes in trade. We have clearly witnessed a dramatic drop in world trade, and may also see an equally dramatic surge. For policy purposes though, an important question is whether the decline is out of line with the global shock to GDP and the underlying credit crisis. At the moment, trade seems to be a victim, but one reflecting nontrade weaknesses in credit and demand.

The countries with the greatest trade shocks were also more exposed to sectors hit hard by the recession, such as the CESEE EU Member States. Owing to their status as catching-up economies, they are on average more heavily exposed to manufacturing sectors than many other economies. Also within the region, the pattern of crisis response is corresponding closely to structural features of individual countries (with the exception of the Baltic states). A comparison between for example Poland (the only EU member which did not enter into recession in 2008/2009 and had a projected growth downturn of 5.5 percentage points between 2007 and 2009) and the Czech Republic (with a projected growth downturn of 10 percentage points) makes clear that structural features matter in this respect: While industry accounts for 30% of GDP in Poland (average from 2006 to 2008) and is thus below the region's average, it represents 38% of GDP in the Czech Republic. This should not lead us to dismiss the region's specialization on (often heavy) machinery and transport equipment and its pronounced export orientation, which was observed over the past one and a half decades. On the contrary, this form of specialization coupled with export orientation proved extremely

helpful. It allowed these countries to exploit their unique geographic location and their highly qualified labor force and set them on an unprecedented growth path up until 2008. In the present situation, they have so far been victims of the general pattern of recession rather than of misconceived industrial policy decisions at the beginning of their catching-up process.

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Estimating Price Elasticities on the Hungarian Consumer Lending and Deposit Markets: Demand Effects and Their Possible Consequences

Dániel Holló¹

In this paper, we use bank product and consumer level data and estimate a random coefficient logit model (RCL) to calculate price elasticities on the Hungarian consumer lending and retail deposit markets in line with the most recent developments in the literature on discrete choice demand estimation. The findings indicate that, on average, demand for domestic currency-denominated loans is more price sensitive than demand for foreign currency loans. The results also suggest that there is an asymmetric substitution effect toward foreign currency-denominated loans as a result of a price increase of domestic currency-denominated loans (i.e. a rise in interest rates on HUF-denominated loans increases the demand for foreign currency loans more than a rise in interest rates on foreign currency loans increases the demand for HUF-denominated loans). Finally, as the substitution effect toward foreign currency-denominated loans is stronger, it might weaken the effectiveness of the interest and exchange rate channels of monetary transmission.

JEL classification: E52, G21, L10

Keywords: Price elasticity of demand, random coefficient logit model, monetary policy, financial stability

1 Introduction

Banks play a significant role in economic processes, but their function is especially important for countries where economic agents have limited possibilities to obtain other forms of financing (i.e. where capital markets are underdeveloped). In such economies, the pricing decisions of financial institutions may considerably influence the consumption and investment behavior of depositors and borrowers and, finally, the evolution of GDP and inflation, the degree of which depends inter alia on the strength of the price sensitivity effects on loan and deposit markets.

In this paper, we examine the most recent developments in the discrete choice demand estimation² literature – e.g. Berry (1994), Berry, Levinsohn and Pakes³ (1995), Nevo (2001), Ho (2007) and Zhou (2007) – and estimate a random coefficient logit (RCL) model to calculate own- and cross-price elasticities in the Hungarian consumer lending and retail deposit markets. Moreover, we try to discover the possible consumer loan demand, retail deposit demand and monetary policy implications of these price sensitivity effects.

Banks' decisions about the interest rates on their assets and liabilities influence the real economy through three main mechanisms. The first comprises the so-called own-price and cross-price elasticity effect, i.e. the effect of price changes on the demand for certain deposit and loan products themselves and on the demand

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² The roots of discrete choice demand estimation go back to the logit demand model of McFadden (1973), which was developed further by Goldberg (1995).

³ Hereinafter referred to as BLP.

for alternative deposit or loan products (i.e. substitutes), and the real economic consequences of these price sensitivity effects (e.g. a less price-sensitive deposit or loan demand does not remarkably influence the consumption, saving and investment behavior of economic agents). The second mechanism is the income effect, i.e. the changes in the earnings and expenditures of economic agents that result from varying interest rates. The change in the realized yields on deposits and debt-servicing costs can be mentioned as an example for a direct income effect, while those multiplier mechanisms that are induced by credit-financed consumption and investment qualify as indirect effects. Finally, the last mechanism is the wealth effect, i.e. the changes in the value of economic agents' real and financial assets.

When speaking of the monetary policy consequences of interest rate changes, we primarily think of how the strength of the two main monetary transmission channels (i.e. the interest rate and exchange rate channels) might be affected by the intensity of the own-price sensitivity of loan demand and the substitution of domestic currency-denominated loans by foreign currency-denominated loans and vice versa.

The consequence of the mutual substitution of domestic and foreign currency-denominated loans can be a portfolio denomination realignment effect as a result of the price increase of loans denominated in either currencies (i.e. the relative prices of domestic and foreign currency-denominated loans change and, as a result, demand for these loans changes as well). The changing currency composition of the portfolio can react to the effectiveness of both the interest and exchange rate channels of domestic monetary transmission. If the portfolio share of foreign currency debt rises due to the increasing interest rates on domestic currency-denominated loans, then the effectiveness of the interest rate channel weakens, while in the short run the exchange rate channel might attenuate as well. As a result of restrictive domestic monetary policy actions, for instance, the exchange rate appreciates, the debt-servicing costs for holders of foreign currency debt decrease and their consumption possibilities expand, which can convey short-run inflation risks.

Substitutability between domestic and foreign currency-denominated loans also has implications on financial stability. On the one hand, Holló and Papp (2007) showed that as a result of the denomination structure of Hungarian households' loan portfolio, its quality is sensitive to exchange rate depreciation.⁴ On the other hand, the relatively high share of foreign currency debt can be further increased by a strong substitution toward foreign currency-denominated products, thereby further increasing the exposure of households' loan portfolio to direct exchange rate risk and indirect credit risk (i.e. changes in households' debt-servicing costs as a result of exchange rate movements).

The novelty of this study is that it employs – for the first time, to our knowledge – the random coefficient logit (RCL) methodology to calculate substitution patterns between various consumer credit and retail deposit products. The main reason for the application of this framework lies not in its computational simplicity, but rather in its other important and favorable properties, which are often neglected in demand estimations. These are as follows:

⁴ *Foreign currency-denominated loans accounted for 59% of the total household loan portfolio in Hungary at the end of 2007 (Source: Financial accounts of Hungarian households for 2007).*

- The RCL methodology handles the problem of representative agent models, as the estimation captures individual or consumer heterogeneity (differences in tastes).⁵
- It enables us to aggregate up individual purchases from the observed distribution of consumer characteristics without observing “true” individual purchase decisions;
- It handles the dimensionality problem of the earlier literature on differentiated product demand systems by projecting the products onto a space of characteristics;
- Finally, and most importantly, as a result of the above it produces more realistic price elasticities of demand compared to standard neoclassical differentiated product demand models.

In addition to its favorable attributes, the RCL methodology also has some weaknesses that might be restrictive in some cases. Its two main shortcomings relate to multiple choices and dynamic demand. The impact of these factors, however, depends upon the market analyzed and the issues the researcher focuses on. Regarding the first factor, we do not think that it imposes a true restriction as neither consumer loans nor retail deposits are typically products of which more than one is “consumed” at the same time.⁶

The problem of dynamic demand usually occurs with either durable, storable or experience goods. Models that are appropriate for dynamic demand estimation can become quite complex, since they often require forward-looking consumers whose behavior depends on the possible distribution of future as well as current offerings of goods. In addition, these future offerings would, in turn, depend on producers’ perceptions of consumer demand (for an application of dynamic demand estimation, see e.g. Hendel and Nevo, 2002).

In our case, neglecting dynamics (especially the dynamic pricing behavior of banks) is the main drawback of the employed framework. However, whether it is a “true” limitation or not depends on the share of forward-looking agents (i.e. banks and customers), which is a conundrum.

All in all, we believe that the favorable attributes of the RCL methodology more than offset its weaknesses, which is also supported by the following policy-relevant main empirical findings:

- The estimation results provide empirical evidence that on average the demand for domestic currency-denominated consumer loans is more price sensitive than the demand for foreign currency consumer loans;
- In addition, the results show that there is an asymmetric substitution effect between domestic and foreign currency-denominated consumer loans. This means that the demand reaction of foreign currency loans to the price change of domestic currency loans is stronger than the change in demand for domestic currency-denominated products that results from interest rate variations in foreign currency loans;

⁵ *The economic and policy implications of a demand model which does not reflect individual heterogeneity and one that explicitly captures this factor (i.e. the RCL model) might be substantially different, since differences in tastes necessarily affect product and firm level demand and, as a result, market shares.*

⁶ *Although there might be situations in which clients take on multiple credit products – either if they encounter payment difficulties or if new claims arise – but from our point of view, it is the timing of these actions that matters, and usually clients do not take on multiple loans at the same time.*

- Finally, as the substitution effect toward foreign currency-denominated consumer loans is stronger, it might weaken the effectiveness of the interest and exchange rate channels of monetary transmission.

The remainder of this paper is organized as follows: In section 2 the empirical methodology is presented, section 3 discusses the empirical results and, finally, section 4 offers a concluding summary.

2 Model Setup

In this section, we provide a technical overview of the employed random coefficient logit demand model.

2.1 The Random Coefficient Logit (RCL) Demand Model

Consider a market (or time period) with J different products; each product j has observed and unobserved (by the econometrician) characteristics and a price. Unobserved characteristics are, inter alia, unobserved promotional activity, brand and/or firm equity or systemic demand shocks. Depending on the data structure, some unobserved components can be captured by product and/or market (time)-specific dummy variables. Following Nevo's (2001) notation, the conditional indirect utility for consumer i from consuming one unit of product j in market (or time period) t in the RCL framework can be expressed as follows:

$$u_{ijt} = \beta_i x_{jt} - \alpha_i p_{jt} + \xi_{jt} + \varepsilon_{ijt} \quad (1)$$

where x_{jt} and p_{jt} (price) are observed product characteristics, ξ_{jt} are unobserved product characteristics, ε_{ijt} is a mean-zero stochastic term and α_i and β_i are individual-specific coefficients.

Observed characteristics vary with the product analyzed. The RCL model describes how consumer preferences vary as a function of individual characteristics, which means that the distribution of individual taste parameters (i.e. α_i and β_i) must be modeled. Similarly to brand characteristics, individual characteristics can be either observed or unobserved. We refer to demographic characteristics as observed, denoted by D_i , and additional attributes as unobserved, denoted by v_i . In respect of observed demographic characteristics, we can either have information about the distribution of the selected attributes from population or consumer surveys or, if such information is not available, but we know the important moments of these demographic characteristics such as the mean and standard deviation, a parametric distribution can be assumed. Unobserved attributes v_i might include factors that may influence consumers' decision-making processes, but are unobserved by the econometrician (such attributes may include an individual's relation to risk or the general financial situation of individuals that influence their participation in the credit market, etc.).

Consumers' taste parameters for the observed product characteristics can be modeled as follows:

$$\begin{pmatrix} \alpha_i \\ \beta_i \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \end{pmatrix} + \Pi D_i + \Sigma v_i \quad v_i \sim P_v^*(v) \quad D_i \sim \hat{P}_D^*(D) \quad (2)$$

where D_i is a $d \times 1$ vector of demographic variables, v_i are the unobserved demographic characteristics discussed above, $P_v^*(v)$ is a parametric distribution (usually

type I extreme value⁷), $\hat{P}_D^*(D)$ is either a parametric or a nonparametric distribution, Π is a $(K+1) \times d$ matrix of coefficients and measures how the taste characteristics vary with demographic characteristics, and Σ is a scaling matrix. The demand system specification is completed with the introduction of an outside option, i.e. consumers may decide to choose services of other financial institutions. The indirect utility from this option is as follows:

$$u_{i0t} = \xi_0 + \pi_0 D_i + \sigma_0 v_{i0} + \varepsilon_{i0t} \quad (3)$$

The mean utility (i.e. ξ_0) from the outside option is normalized to zero. The advantage of normalization is that it does not change the order of preferences over goods. The coefficients π_0 and σ_0 are not identified separately from the individual specific constant term in equation (1). After combining equations (1) and (2), we obtain the following:

$$\begin{aligned} u_{ijt} &= \delta_{jt} (x_{jt}, p_{jt}, \xi_{jt}; \alpha, \beta) + \mu_{ijt} (x_{jt}, p_{jt}, v_i, D_i; \Pi, \Sigma) + \varepsilon_{ijt} \\ \delta_{jt} &= \beta x_{jt} - \alpha p_{jt} + \xi_{jt}, \mu_{ijt} = [p_{jt}, x_{jt}] (\Pi D_i + \Sigma v_i) \end{aligned} \quad (4)$$

Based on equation (4), the indirect utility is expressed as a sum of the mean utility level which is common to all consumers δ_{jt} (i.e. it is independent of consumer characteristics), and the last two terms $\mu_{ijt} + \varepsilon_{ijt}$ represent the mean-zero heteroskedastic deviation from the mean utility, which captures the effects of the random coefficients.

Consumers, by assumption, purchase one unit of a good which provides the highest utility. As within this framework, the individual is defined as a vector of demographic characteristics and product-specific shocks, the set of individual attributes leading to the choice of product j can be formulated as follows:

$$A_{jt} (x_t, p_t, \delta_t; \Pi, \Sigma) = \left\{ \begin{array}{l} (D_i, v_i, \varepsilon_{i0t}, \dots, \varepsilon_{ijt}) \mid u_{ijt} \geq u_{ilt} \\ \forall i = 0, 1, \dots, J \end{array} \right\} \quad (5)$$

where $x_t = (x_{1t}, \dots, x_{Jt})'$, $p_t = (p_{1t}, \dots, p_{Jt})'$ and $\delta_t = (\delta_{1t}, \dots, \delta_{Jt})'$ are observed product characteristics, prices and mean utilities of all the products.

As a firm's pricing decision is based on its expectation about the demand for its products, the expected market share for the firm's product j (firm indices are neglected for notational simplicity) can be expressed as an integral over the mass of consumers in the region A_{jt} , that is:

$$\begin{aligned} s_{jt} (x_t, p_t, \delta_t; \Pi, \Sigma) &= \int_{A_{jt}} dP^* (D, v, \varepsilon) = \\ &= \int_{A_{jt}} dP^* (\varepsilon \mid D, v) dP^* (v \mid D) dP_D^* (D) = \int_{A_{jt}} dP_\varepsilon^* (\varepsilon) dP_v^* (v) d\hat{P}_D^* (D) \end{aligned} \quad (6),$$

where $P^*(\cdot)$ denotes the population distribution function. In expression (6), Bayes' rule is applied, i.e. the independence of D , v and ε is assumed. For a given para-

⁷ The type I extreme value distribution (also known as Gumbel distribution) is usually employed to model the distribution of a number of samples coming from various distributions. The demographic data used in our estimation came from Hungarian household surveys conducted between 2003 and 2008 (for further details, see the data description part in section 3.1). With this distribution it is possible to compute unobserved demographic characteristics that relate to the employed sample of observed demographic characteristics. For a detailed description of the Gumbel distribution, see e.g. Willemse and Kaas (2007).

meter set (i.e. $\alpha, \beta, \Pi, \Sigma$), the integral predicts the market share (s_{jt}) of each bank product in each market (or time period) as a function of product characteristics (x_{jt}), prices (p_{jt}), demographic characteristics (D_i, v_i) and other unknowns.

The intuition behind the model is quite simple, namely it is (implicitly) assumed that firms' observed market shares⁸ (S_{jt}) in time period t represent realized optimal consumer decisions. This means the reason why a consumer chooses product j in time period t from a given firm is simply because the firm's product provides the highest utility. Thus, the bank product level market shares are "constructed" from these individual preference-driven optimal choices. The main goal of our estimation is to recover the individual taste parameters (i.e. α_i and β_i) that will be used for the computation of demand elasticities. This can be done by matching the observed market shares (S_{jt}) with the market shares predicted by the model (i.e. s_{jt} in (6)) as closely as possible.

2.1.1 Estimation

If firm product level data and consumer survey information (either explicit survey data or summary statistics) on the selected demographic characteristics are available, the RCL estimation procedure can be summarized as follows:

- **Step I.** Draw vectors of selected consumer characteristics from population or consumer surveys for each year of the estimation period for a predefined number of individuals (each individual is a vector of demographic characteristics and product-specific shocks). This must be done prior to estimation;
- **Step II.** Determine the choice that each of the selected individuals would make for a given value of the parameter vector. This means we give initial values to the parameter vector $\theta = (\alpha, \beta, \Pi, \Sigma)$ and compute purchase probabilities for each "simulated" individual, then sum these probabilities up and arrive at a prediction of market shares conditional on the parameter vector (i.e. we approximate numerically the integral given in (6));
- **Step III.** Then we apply a search routine that matches the predicted market shares computed in Step II (s_{jt}) with the observed market shares (S_{jt}). If the difference between the predicted and observed market shares exceeds a predefined threshold, the parameter values ($\alpha, \beta, \Pi, \Sigma$) are modified and the predicted market share and the difference are recomputed. If the difference falls below the predefined threshold, the parameters that "generated" the optimal choices are found. More formally, the search routine finds the unique values of δ_{jt} (the mean utility level) that make the predicted market shares (s_{jt}) for a given parameter vector $\theta = (\alpha, \beta, \Pi, \Sigma)$ as close as possible to the observed market shares (S_{jt}). The iteration equation the search routine employs is as follows: $\delta_{jt}^{h+1} = \delta_{jt}^h + \ln(S_{jt}) - \ln(s_{jt}(p_{jt}, x_{jt}, \delta_{jt}^h, \Pi, \Sigma))$, where $\ln(s_{jt}(p_{jt}, x_{jt}, \delta_{jt}^h, \Pi, \Sigma))$ is the natural logarithm of the predicted market share in iteration h ($h=0, \dots, H$) and time period $t=1, \dots, T$, $\ln(S_{jt})$ is the natural logarithm of the observed market share in time period t and δ_{jt}^h is the approximation of the mean utility level (δ_{jt}) in time period t and in the h^{th} iteration. If $\|\delta_{jt}^{h+1} - \delta_{jt}^h\|$ falls below the predefined tolerance level in iteration h , the parameters that "generated" the optimal deci-

⁸ Observed market shares were computed as follows: $S_{kjt} = \frac{RV_{kjt}}{RV_t}$, where RV_t is the total consumer loan or deposit stock of MFIs in time period t and RV_{kjt} is the stock of the consumer loan or deposit product j ($j=1, \dots, J$) of bank k ($k=1, \dots, K$) in time period t .

sion are found.⁹ Then, equation (4) implies $\omega_{jt} = \delta_{jt}(S_{jt}, \Pi, \Sigma) - (\beta x_{jt} + \alpha p_{jt}) \equiv \xi_{jt}$, that is the unobserved product characteristics (ξ_{jt}) are expressed as a function of parameters, $\theta = (\alpha, \beta, \Pi, \Sigma)$ and the employed data (x_{jt}, p_{jt}, S_{jt}) .

- **Step IV.** Finally, the General Method of Moments (GMM) procedure is used to estimate our RCL model. We interact ξ_{jt} with the function of instruments Z and find the exact value of $\theta = (\alpha, \beta, \Pi, \Sigma)$ that makes the sample moments as close as possible to zero.¹⁰

Section 2.2 provides details on the employed instrumental variables.

2.1.2 Elasticities

As mentioned in the introduction, one of the main advantages of the RCL framework is that it allows for flexible substitution patterns by introducing utility shocks that are correlated across products. These shocks will ensure that the borrower in question will be more likely to take a loan with attributes similar to his or her first choice if the price of the first choice increases. By examining equation (4), this correlation can be generated either through ε_{ijt} or μ_{ijt} . The latter captures the effect of both observed D_i and unobserved v_i demographic characteristics. We turn our attention to modeling the correlation between choices obtained through the observed demographic characteristics in μ_{ijt} . That is, we assume that the correlation of “utility shocks” is a function of product and borrower characteristics, which will ensure that products with similar attributes and borrowers with similar demographic characteristics will have similar product rankings and, therefore, similar substitution patterns.

The price elasticities of the market shares defined by equation (6) can be calculated as follows:

$$\eta_{jkt} = \frac{\partial s_{jt} p_{kt}}{\partial p_{kt} s_{jt}} = -\frac{p_{kt}}{s_{jt}} \int \alpha_i s_{ijt} (1 - s_{ijt}) d\hat{P}_D^*(D) dP^* \quad \text{if } i = j \quad (7)$$

$$\text{and } \eta_{jkt} = \frac{\partial s_{jt} p_{kt}}{\partial p_{kt} s_{jt}} = \frac{p_{kt}}{s_{jt}} \int \alpha_i s_{ijt} s_{ikt} d\hat{P}_D^*(D) dP_v^*(v) \quad \text{if } i \neq j$$

where $s_{ijt} = \frac{\exp(\delta_{jt} + \mu_{ijt})}{1 + \sum_{k=1}^K \exp(\delta_{kt} + \mu_{ikt})}$ is the probability that individual i purchases

product j . Now elasticities are determined by the price sensitivity of each borrower, which will be averaged to mean price sensitivity using the purchase probabilities of simulated individuals as purchase weights. Since the RCL model allows for flexible substitution patterns (i.e. the composite random shock $\mu_{ijt} + \varepsilon_{ijt}$ is not independent of product and consumer characteristics), this flexibility will ensure that in the event of changing product prices, borrowers will be more likely to switch to products with similar characteristics.

⁹ See BLP (1995) for further details.

¹⁰ For a detailed technical description, see BLP (1995) and Nevo (2001).

2.2 Instruments

The price variable p_{it} is very likely correlated with unobserved product characteristics, i.e. the price variable is not strictly exogenous, which leads to biased and inconsistent parameter estimates. This problem can be handled by the instrumental variable (IV) approach. In order to estimate the demand equation for both consumer credit and deposit markets, the following set of instruments is used to identify the price coefficients:

(8) $Z=(\text{administrative costs to total assets, credit risk, liquidity, rival employee per branch, rival branch number, rival salary per employee})$

The instruments consist of several cost shifters, which are, theoretically, valid instruments because they affect prices but are not related to unobserved product characteristics. The first cost shifter is the ratio of administrative costs (including all noninterest expenses) to total assets. Credit risk can also be considered a cost shifter since high credit risk may entail higher operation costs due to monitoring and auditing, therefore higher credit risk might shift up the cost function. Credit risk is proxied by the ratio of loan loss provisions to total loans. Furthermore, liquidity variables might be informative about credit risk and, thus, about the cost function. Banks' liquidity is proxied by the ratio of cash and negotiable instruments to total assets.

Mark-up shifters were also used as instruments; they include other banks' characteristics such as the competitors' number of employees per branch, their branch number and salary per employee.¹¹ Given that the product characteristics are exogenous, these instruments are orthogonal to unobserved product characteristics.

3 Empirical Analysis

In this section, we first describe the data set and define the variables used. We then present the empirical results of the credit and deposit demand estimations.

3.1 Data and Variable Description

Estimating the model previously described requires bank product level data such as information on market shares, prices of consumer loans and deposits as well as product characteristics (in our case bank characteristics) such as a bank's number of branches and age. These data stem from Magyar Nemzeti Bank's banking database and cover the period between March 2004 and August 2007 for consumer loans,¹² and between January 2003 and August 2007 for retail deposits. Data were adjusted for revaluation effects caused by exchange rate changes.

In our analysis, we defined 15 consumer lending and 3 retail deposit submarkets. The consumer lending submarkets are as follows: hire purchase HUF-denominated loans with short maturities and maturities up to five years; personal HUF- and CHF-denominated loans with short maturities, maturities up to five

¹¹ The "competitors' salary per employee" indicator might reflect service quality through an indirect channel, namely employees' quality. If a bank pays high salaries, the best qualified employees can be expected to choose to work there.

¹² Our analysis of the consumer credit market covers the period between March 2004 and August 2007, since the denomination composition of the various loan products is only available from March 2004.

years and maturities over five years; overdraft, home equity HUF- and CHF-denominated loans with short maturities, maturities up to five years and maturities over five years. In Hungary, the aforementioned lending products are considered consumer loans. These loans vary in purpose and in whether they are secured or not. Hire purchase loans are designated for the consumption of durable goods, personal and overdraft loans can be employed either for durable goods consumption or for managing temporary liquidity problems. Home equity loans also belong in this category and have become very popular over the past three to four years mainly due to their secured nature and the related price advantage compared to the aforementioned unsecured products and their versatile utilization possibilities (house, car, durable goods purchase). Regarding retail deposit submarkets, we considered three different types: demand deposits (without maturity), short-term deposits (maturities up to two years) and long-term deposits (maturities over two years) as these are the main retail deposit products provided by banks in Hungary. These types of deposits account for approximately 40% to 50% of Hungarian households' financial savings.¹³ Descriptive statistics of the consumer loan and retail deposit products analyzed in this paper can be found in table A1 in the annex.

Bank product level market shares, which were computed separately for the consumer credit and retail deposit submarkets for each month of the estimation period, constitute one of the main model variables. For each submarket in time period t we divided consumer loan or retail deposit stocks at the bank product level by the total consumer loan or retail deposit stocks of MFIs in time period t (for a more formal description, see footnote 8).

The most important explanatory variables are the price proxies. As a loan price proxy, we use the monthly interest rate on stocks, while prices for deposits are calculated as the difference between monthly deposit interest rates on stocks and service fees for deposits. The latter are approximated by the ratio of revenues from fees and commissions to the retail deposit stock. A relevant part of the required data set consists of product characteristics, which play an important role in our estimation as, on the one hand, they explain the mean utility level $\delta(\cdot)$ and, on the other hand, they drive the substitution patterns $\mu(\cdot)$ in equation (4). We choose bank attributes based on data availability and observability to consumers as observed characteristics, namely banks' branch number and age. These characteristics represent the service quality provided by banks, such as the convenience of local branches, and capture factors such as reputation, experience and reliability.

Finally, information about the distribution of demographic characteristics \hat{P}_d^* is important for the RCL demand estimations. We choose three demographic attributes that might have relevance for influencing consumer decisions: customers' disposable income (in HUF), age (in years) and level of education (elementary, secondary, higher). For the RCL estimation, we need information about the joint distribution of these demographic characteristics for each year of the respective estimation period (2004 to 2007 for consumer loans and 2003 to 2007 for retail

¹³ Source: *Financial accounts of Hungarian households between 2004 and 2007*.

deposits). For this purpose, 500 individuals were selected randomly from household surveys conducted in Hungary between 2003 and 2008.¹⁴

3.2 Estimation Results

3.2.1 The Consumer Credit Market

Estimation results for the preferred consumer credit demand specification can be found in table 1 below.

The means of the distribution of marginal utilities (alpha and betas) are presented in the second column. All of the coefficients are statistically significant. Estimates of heterogeneity around these means are presented in columns 3 to 6. Among the interactions with demographic characteristics, the interaction between interest rate and customers' income, interest rate and customers' education, and the number of bank branches and customers' education proved to be significant.¹⁵ The price variable has the expected sign, which means an increase in the interest rate decreases the quantity demanded in the consumer credit submarkets and thus the bank's market share. Both the size of the branch network and the age of the financial institution positively influence the product's utility for an average consumer. The former can be explained by the significant role bank branches still play as distribution channels. The latter might indicate that people trust "old," safe and experienced financial institutions more and, as a result, clients are more likely to resort to financial services provided by these "older" banks.

The interpretation of parameter estimates is straightforward. The marginal valuation of prices (i.e. interest rates), for instance, increases with income, denoting that wealthier consumers are less price sensitive, but decreases with education,

Table 1

Coefficient Estimates of the Consumer Credit Demand Model

Variable	Mean (alpha and betas)	Standard deviation (sigmas)	Interaction terms		
			Customers' income	Customers' age	Customers' education
Interest rate	-33.05 (13.56)	1.83 (9.07)	16.58 (8.20)	-0.63 (1.29)	-0.06 (0.025)
Number of bank branches	1.36 (0.28)	0.01 (1.84)	0.02 (0.89)	-	3.28 (0.21)
Age of bank	1.15 (0.07)	0.004 (1.79)	-1.29 (0.99)	-	0.60 (0.64)
Constant	-7.04 (0.28)	0.49 (2.76)	13.33 (7.81)	-	-

Source: Author's calculations.

Note: The regression includes bank product dummies, time dummies and, as instruments, cost and mark-up shifters. The instruments used proved to be valid according to Hansen's J-statistic in the framework of a simple logit model (IV validity cannot be explicitly tested in the RCL model; results are not reported here, but available upon request). Asymptotically robust standard errors are given in parentheses.

¹⁴ Individuals were selected from GfK household surveys for Hungary for the years 2003, 2004 and 2005, while for 2006 and 2007 we used the surveys conducted by the MNB in January 2007 and 2008, respectively (the data in the MNB surveys contain information on households' financial situation, loans and demographic characteristics for 2006 and 2007). In the numerical calculation of the integral given in equation (6), we employed the same 500 randomly selected individuals both for the consumer credit and retail deposit markets. The accuracy of the results was also checked by simulating 800 and 1,100 individuals, respectively. However, except for the running time of the program code, the parameter estimates did not show substantial qualitative differences.

¹⁵ Several interaction relationships were tested, but only a few provided economically meaningful results. The interactions depicted in table 1 proved to be the only ones of several relationships tested that were both statistically and economically significant.

which suggests that more educated persons are more sensitive to loan interest rate fluctuations than less educated persons. It may be true that better-educated people are more able to collect and synthesize information and, as a result, are more conscious in their decision-making (i.e. they react more sensitively e.g. to product price fluctuations). Furthermore, the estimate of the standard deviation (sigma is not statistically significant) suggests that most of customers' heterogeneity is explained by the selected demographic characteristics.¹⁶

Table 2 presents the own- and cross-price elasticities for the most relevant consumer loans, which account for a dominant share within the consumer loan category. The most relevant consumer loan products are as follows: hire purchase

Table 2

Own- and Cross-Price Elasticities on the Hungarian Consumer Credit Market

Consumer loans (denomination, maturity)	Hire purchase loans (HUF, short maturity)	Hire purchase loans (HUF, maturity up to 5 years)	Personal loans (HUF, maturity over 5 years)	Own-price elasticities
	August 2007	August 2007	August 2007	2004–2007
Hire purchase loans (HUF, short maturity)	-2.30	0.46	0.40	-3.64
Hire purchase loans (HUF, maturity up to 5 years)	0.20	-2.12	0.20	-3.59
Personal loans (HUF, maturity over 5 years)	0.30	0.30	-2.52	-4.19
Overdraft loans (HUF)	0.32	0.30	0.30	-4.17
Home equity loans (HUF, maturity over 5 years)	0.22	0.20	0.21	-2.95
Home equity loans (CHF, short maturity)	0.40	0.10	0.10	-3.52
Home equity loans (CHF, maturity over 5 years)	0.24	0.21	0.24	-3.55
	Overdraft (HUF)	Home equity loans (HUF, maturity over 5 years)	Home equity loans (CHF, short maturity)	Own-price elasticities
Hire purchase loans (HUF, short maturity)	0.41	0.35	0.40	-3.64
Hire purchase loans (HUF, maturity up to 5 years)	0.20	0.17	0.39	-3.59
Personal loans (HUF, maturity over 5 years)	0.30	0.30	0.20	-4.19
Overdraft loans (HUF)	-2.23	0.29	0.26	-4.17
Home equity loans (HUF, maturity over 5 years)	0.21	-2.37	0.30	-2.95
Home equity loans (CHF, short maturity)	0.10	0.10	-1.41	-3.52
Home equity loans (CHF, maturity over 5 years)	0.22	0.24	0.43	-3.55
	Home equity loans (CHF, maturity over 5 years)	Home equity loans (CHF, maturity up to 5 years)	Personal loans (CHF, maturity up to 5 years)	Own-price elasticities
Hire purchase loans (HUF, short maturity)	0.20	0.25	0.28	-3.64
Hire purchase loans (HUF, maturity up to 5 years)	0.25	0.30	0.16	-3.59
Personal loans (HUF, maturity over 5 years)	0.24	0.24	0.40	-4.19
Overdraft loans (HUF)	0.30	0.29	0.40	-4.17
Home equity loans (HUF, maturity over 5 years)	0.40	0.40	0.29	-2.95
Home equity loans (CHF, short maturity)	0.51	0.49	0.10	-3.52
Home equity loans (CHF, maturity over 5 years)	-1.12	0.44	0.29	-3.55

Source: Author's calculations.

Note: Field values (except in the right-hand column) indicate the elasticity of the column brand with respect to changes in the price of the row brand. Bold numbers denote the strongest demand reaction of the column brands to a price increase of the row brand. Numbers in italics show own-price elasticities.

¹⁶ Frequency distribution charts of the estimated coefficients (i.e. interest rate, number of branches, age of bank) of the consumer loan demand model are available upon request. These charts show the distribution of the valuation of respective product characteristics across the population.

loans (denominated in HUF with short maturities and with maturities up to five years), personal loans (denominated in HUF with maturities over five years), overdraft and home equity loans (denominated in HUF with maturities over five years and denominated in CHF with short maturities and maturities over five years).¹⁷

Own-price elastic loan demand can be observed in every case (own-price elasticities of demand are greater than one in absolute value). The mean own-price sensitivity across the 15 lending submarkets (personal, home equity, hire purchase and overdraft loans with different maturities and denominations) considered was -3.7 between 2004 and 2007 (i.e. a 1% price rise decreases the demand for consumer loans by 3.7% on average). If we make a distinction between domestic and foreign currency-denominated loans and compute the average own-price elasticities separately across these submarkets, it seems that the demand for HUF-denominated consumer loans is on average more price sensitive than the demand for foreign currency loans. In the case of HUF-denominated loans, a 1% rise in interest rates on HUF-denominated consumer loans decreases the demand for this type of loans by 3.78% on average, while for foreign currency consumer loans the mean demand decrease of a 1% rise in interest rates on foreign currency consumer loans is 3.55%. The asymmetric own-price effect between HUF- and foreign currency-denominated products is more pronounced if the averages are computed without home equity loans. In this case, the mean own-price elasticity of HUF-denominated consumer loans is -4 , while for foreign currency-denominated consumer loans it is -3.58 .

The quantitative differences between foreign currency- and HUF-denominated products' own-price elasticities computed with and without home equity loans can be explained by the below-average own-price sensitivity of home equity loans. At least two explanations can be given for these differences. First, as home equity loans are secured products, it is easier for wealthier clients to have access to these credits (as they have their own houses or flats to use as collateral) and, as suggested by the estimation results presented in table 1, wealthier clients are less price sensitive. Second, there might be an interest rate level effect. Namely, due to the secured nature of home equity loans, their interest rates are lower than those on other consumer loans. Therefore, a 1% price rise from a lower interest rate level might reduce the demand for these loans to a lesser extent than a 1% price increase from the higher interest rate level of other consumer loans decreases the demand for these unsecured products.

Table 2 also shows cross-price elasticities.

Substitution effects were analyzed along three dimensions: loan denomination, loan type (secured or unsecured) and maturity. Similarly to the case of own-price elasticities, mean cross-price sensitivities were computed separately across all the HUF and foreign currency lending submarkets considered and excluding home equity loans. The estimated cross-price elasticities indicate that the substitution effect between loans denominated in different currencies is asymmetric. The average cross-price elasticities between HUF and foreign currency-denominated con-

¹⁷ These products account for approximately 80% to 90% of the total consumer loan stock in Hungary. Results of own- and cross-price elasticities for all the consumer loans included in the estimation are available upon request. The mean own- and cross-price effects mentioned in this paper were computed for all the consumer lending submarkets considered.

sumer loans is 0.28. This means that a 1% rise in interest rates on HUF-denominated consumer loans increases the demand for foreign currency-denominated consumer loans by 0.28% on average. By contrast, a 1% rise in interest rates on CHF-denominated loans increases the demand for HUF loans by 0.2% on average. If home equity loans are excluded from the calculation of mean cross-price elasticities, the previous results do not change substantially; substitution is still asymmetric and of similar size. The respective results are 0.3% and 0.19% instead of 0.28% and 0.2%, respectively. This suggests that whether a loan is secured or not seems to be irrelevant from the point of view of the strength of cross-price effects in the loan denomination dimension.

The results given above have implications on monetary policy: They show that substitution among domestic and foreign currency loans can result in a portfolio realignment effect toward foreign currency-denominated debt as a consequence of the “price” increase of domestic currency-denominated credit (i.e. the relative prices of and, as a result, the demand for domestic and foreign currency-denominated loans changes). This can weaken the effectiveness of the interest rate channel due to the rising share of foreign currency debt and might, at the same time, also have an influence on financial stability. The reason for this latter possibility is that exchange rate developments directly impact the debt-servicing cost for foreign currency debt holders and their payment ability. Beside the interest rate channel, the exchange rate channel is of particular importance in monetary transmission in Hungary (Vonnák 2007). However, the effectiveness of the exchange rate channel might also be affected by the realignment toward foreign currency debt. A restrictive domestic monetary policy, for instance, leads to an exchange rate appreciation which, in turn, is favorable for both long-run inflation prospects and the evolution of debt-servicing costs for foreign currency debt holders. However, in the short run restrictive monetary policy action might induce inflationary pressure as it directly mitigates the debt-servicing costs of foreign currency debt holders and as a result expands their consumption possibilities.

Substitution was analyzed in the secured/unsecured dimension as well. Average cross-price elasticities were computed between unsecured (hire purchase, personal, overdraft) and secured (home equity) consumer loans across all maturities and denominations. The results thus obtained indicate that the demand for secured loans increases more (by 0.26% on average) if the prices of unsecured loans increase by 1% than the demand for unsecured loans increases (by 0.2% on average) as a result of a 1% price rise of secured consumer loans. This finding can be explained by the differences in the interest rate levels of secured and unsecured products. Even if the interest rates on home equity products rise, they might be still significantly below the average interest rate on unsecured loans; it is therefore not worthwhile to substitute a home equity loan for an unsecured loan.

Furthermore, substitution operates not only among products of different denominations or types (secured/unsecured), but also among products with different maturities. For instance, a CHF-denominated home equity loan with a maturity of over five years is most sensitive to the price change of HUF-denominated home equity loans with a maturity of over five years (cross-price elasticity of 0.4) and of CHF-denominated home equity loans with short maturities (cross-price elasticity of 0.51). At the same time, the same type of loan is found to be least

sensitive to a change in the price of hire purchase loans denominated in HUF with short maturities (cross-price elasticity of 0.2).

3.2.2 The Deposit Market

Estimation results for the retail deposit demand model can be found in table 3 below. The means of the distribution of marginal utilities (alpha and betas) are given in the second column and estimates of heterogeneity around these means are presented in columns 3 to 6.

Considering the interaction of interest rates, branch number and bank age with demographic characteristics, that of interest rates and customers' income, branch number and customers' age, bank age and customers' income and, finally, bank age and customers' age prove to be significant.¹⁸ The sign of the price variable indicates that an increase in deposit interest rates increases the demand for deposits and thereby increases the bank's market share on the retail deposit markets. The size of a bank's branch network positively influences the utility for an average consumer, while a bank's age negatively influences average consumer utility.¹⁹ The latter finding might indicate that when opening a deposit account at a bank, average consumers mainly base their decision on the deposit interest rates offered.

The marginal valuation of deposit interest rates increases with income, suggesting that wealthier consumers are less sensitive to deposit interest rate fluctuations than less wealthy ones. Another interpretation might be that wealthier clients are hit to a lesser degree by a substantial deposit interest rate decline than consumers with limited financial resources. However, a comparison of the coefficients of the interactions between interest rate and income on retail deposit (0.99) and consumer credit markets (16.58) shows a substantial difference, which might indicate that although wealthier consumers are less price sensitive than less wealthy ones, their cost and revenue sensitivity differs and wealthier consumers are more cost than revenue sensitive. The estimate of the sigma (i.e. the standard deviation)

Table 3

Coefficient Estimates of the Retail Deposit Demand Model

Variable	Mean (alpha and betas)	Standard deviation (sigmas)	Interaction terms		
			Customers' income	Customers' age	Customers' education
Interest rate	60.47 (23.24)	3.51 (21.68)	0.99 (0.31)	-1.19 (0.62)	2.28 (27.97)
Number of bank branches	3.62 (0.028)	0.016 (0.35)	-0.22 (0.48)	0.05 (0.012)	-
Age of bank	-0.29 (0.036)	0.075 (0.25)	1.62 (0.29)	0.14 (0.017)	-
Constant	1.24 (0.028)	0.26 (0.29)	7.23 (1.72)	-	-

Source: Author's calculations.

Note: The regression includes bank product dummies, time dummies and, as instruments, cost and mark-up shifters. The instruments used proved to be valid according to Hansen's J-statistic in the framework of a simple logit model (IV validity cannot be explicitly tested in the RCL model; results are not reported here, but available upon request). Asymptotically robust standard errors are given in parentheses.

¹⁸ Several interaction relationships were tested, but only a few provided economically meaningful results. The interactions depicted in table 3 proved to be the only ones that were both statistically and economically significant.

¹⁹ Frequency distribution charts of the estimated coefficients of the deposit demand model are available upon request.

Table 4

Own- and Cross-Price Elasticities on the Hungarian Retail Deposit Market

	Demand deposits (HUF, without maturity)	Short-term deposits (HUF, maturity up to 2 years)	Long-term deposits (HUF, maturity over 2 years)	Own-price elasticities
	<i>August 2007</i>	<i>August 2007</i>	<i>August 2007</i>	<i>2003–2007</i>
Demand deposits (HUF, without maturity)	1.62	-0.34	-0.35	1.49
Short-term deposits (HUF, maturity up to 2 years)	-0.30	4.42	-0.44	3.24
Long-term deposits (HUF, maturity over 2 years)	-0.24	-0.25	5.32	3.96

Source: Author's calculations.

Note: Field values (except in the right-hand column) indicate the elasticity of the column brand with respect to changes in the price of the row brand. Bold numbers denote the strongest demand reaction of the column brands to a price increase of the row brand. Numbers in italics show own-price elasticities.

is insignificant, indicating the relevant role the selected demographic characteristics play in the explanation of heterogeneity.

Table 4 shows the own- and cross-price elasticities by retail deposit product categories. Similarly to demand for consumer loans, the demand for deposits is also price elastic (i.e. the own-price elasticity is greater than one in absolute value), signifying that clients increase or decrease their deposit demand by more than 1% as a result of a 1% change in deposit interest rates.

Not surprisingly, the own-price elasticities of various deposit products are positive, while their cross-price elasticities are negative, indicating that the rise in deposit interest rates positively affects demand for the product itself and decreases demand for substitutes, albeit to a different degree. It can be observed that the demand reaction of long-term deposits to the price increase of short-term deposits is more pronounced than that of demand deposits, which can be explained by the fact that short- and long-term deposits are closer substitutes than either long-term and demand deposits or short-term and demand deposits.

4 Summary and Conclusion

In this paper, we use bank product and consumer level data to estimate a random coefficient logit (RCL) demand model in order to compute price elasticities on the Hungarian consumer lending and retail deposit markets and to derive the corresponding possible loan, deposit demand and monetary policy implications.

Our analysis covered a sample period from January 2003 to August 2007 for consumer loans and from March 2004 to August 2007 for retail deposits. By making a distinction between maturities, denomination structures and loan types (secured/unsecured), we defined 15 lending and 3 deposit submarkets.

We showed that the demand for HUF-denominated consumer loans is more price sensitive than the demand for foreign currency loans (i.e. asymmetric own-price effect): A 1% rise in interest rates on HUF-denominated consumer loans decreases demand for this type of loan by more (3.78% on average) than a 1% rise in interest rates on CHF-denominated loans decreases the demand for CHF-denominated loans (3.55% on average).

Furthermore, empirical evidence is found for an asymmetric substitution effect between domestic and foreign currency-denominated consumer loans, which means that the demand for foreign currency loans increases more strongly in response to a 1% price increase of HUF-denominated loans (0.28% on average) than the demand for HUF-denominated loans increases if the interest rate on CHF-denominated loans rises by 1% (0.2% on average).

Finally, the asymmetric substitution effect toward foreign currency loans impacts the strength of the interest and exchange rate channels of monetary transmission. The interest rate channel is directly influenced by the increasing portfolio share of foreign currency debt, while restrictive domestic monetary actions may weaken the exchange rate channel in the short run due to their exchange rate appreciation effect, which directly mitigates debt-servicing costs and expands the consumption possibilities of foreign currency debt holders and therefore may convey short-term inflation risks.

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Annex

Table A1

Descriptive Statistics of Consumer Loans, Retail Deposits and Selected Bank Characteristics in Hungary (2003–2007)

	Mean	Standard deviation	Minimum	Maximum
<i>HUF million</i>				
Consumer loans (bank level)				
Hire purchase loans (HUF, short maturity)	1,023	1,559	1	6,700
Hire purchase loans (HUF, maturity up to 5 years)	7,689	13,471	1	46,519
Personal loans (HUF, short maturity)	395	1,203	1	5,394
Personal loans (HUF, maturity up to 5 years)	11,624	27,878	3	128,749
Personal loans (HUF, maturity over 5 years)	4,914	10,802	1	57,376
Personal loans (CHF, short maturity)	35	43	1	187
Personal loans (CHF, maturity up to 5 years)	7,049	10,423	1	37,921
Personal loans (CHF, maturity over 5 years)	5,568	7,376	1	40,309
Overdraft loans (HUF)	8,190	16,349	1	100,764
Home equity loans (HUF, short maturity)	77	107	1	336
Home equity loans (HUF, maturity up to 5 years)	340	436	2	2,644
Home equity loans (HUF, maturity over 5 years)	2,559	3,758	7	17,950
Home equity loans (CHF, short maturity)	334	1,108	1	4,641
Home equity loans (CHF, maturity up to 5 years)	809	976	1	5,060
Home equity loans (CHF, maturity over 5 years)	33,165	38,856	10	170,669
Retail deposits (bank level)				
Demand deposits (HUF, without maturity)	52,451	114,935	4	660,446
Short-term deposits (HUF, maturity up to 2 years)	132,035	241,145	6	1,236,703
Long-term deposits (HUF, maturity over 2 years)	10,516	22,908	1	110,389
Bank characteristics				
Branch number	94	116	1	432
Age (years)	29	21	6	85
%				
Interest rates of consumer loans				
Hire purchase loans (HUF, short maturity)	22.47	11.99	1.23	45.19
Hire purchase loans (HUF, maturity up to 5 years)	22.78	10.75	5.96	40.04
Personal loans (HUF, short maturity)	20.05	6.00	3.82	30.11
Personal loans (HUF, maturity up to 5 years)	20.47	4.83	8.29	31.57
Personal loans (HUF, maturity over 5 years)	19.86	5.04	6.86	30.23
Personal loans (CHF, short maturity)	15.26	4.82	5.97	23.80
Personal loans (CHF, maturity up to 5 years)	12.75	4.18	2.39	24.79
Personal loans (CHF, maturity over 5 years)	11.15	2.82	4.66	15.43
Overdraft loans (HUF)	17.62	7.26	3.36	35.92
Home equity loans (HUF, short maturity)	16.73	5.02	6.22	27.95
Home equity loans (HUF, maturity up to 5 years)	14.66	2.88	8.29	20.73
Home equity loans (HUF, maturity over 5 years)	15.45	3.23	8.29	22.00
Home equity loans (CHF, short maturity)	4.76	1.09	2.72	7.91
Home equity loans (CHF, maturity up to 5 years)	4.62	1.01	3.00	7.65
Home equity loans (CHF, maturity over 5 years)	4.41	1.08	1.49	6.85
Interest rates of retail deposits				
Demand deposits (HUF, without maturity)	3.08	1.95	0.03	10.28
Short-term deposits (HUF, maturity up to 2 years)	7.18	2.05	2.38	12.11
Long-term deposits (HUF, maturity over 2 years)	6.90	2.21	1.71	13.03

Source: Author's calculations.

Highlights

Olga Radzyner Award 2010 for Scientific Work on European Economic Integration

The Oesterreichische Nationalbank has established an award to commemorate Olga Radzyner, former Head of the Foreign Research Division, who died in a tragic accident in August 1999. The award is bestowed on young economists for excellent research focused on topics of European economic integration and is conferred annually. In 2010, four applicants are eligible to receive a single payment of EUR 3,000 each from an annual total of EUR 12,000.

The submitted work shall be in English or in German, should not exceed approximately 30 pages and shall preferably be in the form of a working paper or a scientific article. The topic of the submitted work should be on European economic integration issues. Authors shall submit the work before their 35th birthday and shall be citizens of any of the following countries: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, FYR Macedonia, Hungary, Kosovo, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia and Ukraine. Previous winners of the Olga Radzyner Award, ESCB central bank employees as well as current and former OeNB staff are not eligible. In case of coauthored work, each of the coauthors has to fulfill all the criteria.

To identify their work as a submission, applicants shall mark the envelope with the reference "Olga Radzyner Award" and send it to the Oesterreichische Nationalbank, Foreign Research Division, Otto-Wagner-Platz 3, PO Box 61, 1011 Vienna, Austria. The Oesterreichische Nationalbank shall receive the work submitted for the award in 2010 by October 4, 2010, at the latest.

For more information, please see www.oenb.at or contact Eva Gehringer-Wasserbauer in the Foreign Research Division of the Oesterreichische Nationalbank either by e-mail (eva.gehringer-wasserbauer@oenb.at) or by phone (+43-1-40420-5205).

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Notes

Legend, Abbreviations and Definitions

Legend

x = No data can be indicated for technical reasons

.. = Data not available at the reporting date

Discrepancies may arise from rounding.

Abbreviations

ATM	at-the-money
BIS	Bank for International Settlements
BOFIT	Bank of Finland Institute for Economies in Transition
CAR	capital adequacy ratio
CEE	Central and Eastern Europe(an)
CEEI	Conference on European Economic Integration (OeNB)
CEPR	Centre for Economic Policy Research
CESEE	Central, Eastern and Southeastern Europe(an)
CESEE MS	Central, Eastern and Southeastern European (EU) Member States
CDS	credit default swap
CIS	Commonwealth of Independent States
CPI	consumer price index
DOC	direction of change
EJF	East Jour Fixe (OeNB)
EBRD	European Bank for Reconstruction and Development
ECB	European Central Bank
EMU	Economic and Monetary Union
ESA 95	European System of Accounts 1995
ESCB	European System of Central Banks
EU	European Union
FDI	foreign direct investment
FEEI	Focus on European Economic Integration (OeNB)
FSI	financial sentiment indicator
FX	foreign exchange
GDP	gross domestic product
GFCF	gross fixed capital formation
HICP	Harmonised Index of Consumer Prices
IFI	international financial institution
IMF	International Monetary Fund
MFI	monetary financial institution
NCB	national central bank
NFA	net foreign assets
NPL	nonperforming loan
OECD	Organisation for Economic Co-operation and Development
OTC	over-the-counter
PPP	purchasing power parity
RCL	random coefficient logit
RMSE	root mean square error
RND	risk-neutral density (function)

ROE	return on equity
SEE	Southeastern Europe(an)
UN	United Nations
VAR	vector autoregressive
wiiw	Wiener Institut für internationale Wirtschaftsvergleiche (The Vienna Institute for International Economic Studies)

National Central Banks

BNB	Bulgarian National Bank
BoA	Banka e Shqipërisë (Bank of Albania)
BOF	Suomen Pankki – Finlands Bank (Bank of Finland)
BNR	Banca Națională a României (National Bank of Romania)
BS	Banka Slovenije (Bank of Slovenia)
CBBH	Centralna banka Bosne i Hercegovine (Central Bank of Bosnia and Herzegovina)
CBCG	Centralna banka Crne Gore (Central Bank of Montenegro)
CBR	Central Bank of the Russian Federation (Bank of Russia)
ČNB	Česká národní banka (Czech National Bank)
HNB	Hrvatska narodna banka (Croatian National Bank)
MNB	Magyar Nemzeti Bank (Hungary's central bank)
NBP	Narodowy Bank Polski (National Bank of Poland)
NBS	Národná banka Slovenska (Slovakia's central bank)
NBS	Narodna banka Srbije (National Bank of Serbia)
NBU	National Bank of Ukraine
OeNB	Oesterreichische Nationalbank (Austria's central bank)
TCMB	Türkiye Cumhuriyet Merkez Bankası (Central Bank of the Republic of Turkey)

ISO Currency Codes

ALL	Albanian lek
BGN	Bulgarian lev
CHF	Swiss franc
CZK	Czech koruna
EUR	euro
HRK	Croatian kuna
HUF	Hungarian forint
PLN	Polish złoty
RON	Romanian leu
RSD	Serbian dinar
RUB	Russian ruble
SFR	Swiss franc
SIT	Slovenian tolar
SKK	Slovak koruna
TRY	Turkish lira
USD	U.S. dollar

ISO Country Codes

AL	Albania
AR	Argentina
AT	Austria
BA	Bosnia and Herzegovina
BE	Belgium
BG	Bulgaria
BR	Brazil
BY	Belarus
CL	Chile
CO	Colombia
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
KZ	Kazakhstan
LT	Lithuania
LU	Luxembourg
LV	Latvia
MD	Moldova
ME	Montenegro
MK	former Yugoslav Republic of Macedonia (FYR Macedonia)
MT	Malta
MX	Mexico
NL	Netherlands
PE	Peru
PL	Poland
PT	Portugal
RO	Romania
RS	Serbia
RU	Russia
SE	Sweden
SI	Slovenia
SK	Slovakia
TR	Turkey
UA	Ukraine
UK	United Kingdom
VE	Venezuela

Definitions

Croatia, FYR Macedonia and Turkey are candidate countries within the EU enlargement process. Candidate countries are countries which have formally applied to the European Union for membership and have been officially recognized by the European Council as a candidate for membership. Accession negotiations with Croatia and Turkey were opened in October 2005. No date has been set yet for the opening of accession negotiations with FYR Macedonia.

Albania, Bosnia and Herzegovina, Montenegro, Serbia and Kosovo under UNSC Resolution 1244/99 are potential EU candidate countries, i.e. countries that may become officially recognized candidates for membership. Western Balkan countries involved in the Stabilisation and Association process are recognized as potential candidate countries.

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The Annual Report of the OeNB provides a broad review of Austrian monetary policy, economic conditions, new developments in the financial markets in general and in financial market supervision in particular as well as of the OeNB's changing responsibilities and its role as an international partner in cooperation and dialogue. It also contains the OeNB's financial statements.

Intellectual Capital Report annual

The Intellectual Capital Report is a review of the OeNB's intellectual capital and its use in the OeNB's business processes and services. The report clarifies the relationships between different types of human, relational, structural and innovation capital and describes various determinants that influence the OeNB's intellectual capital. The report provides an integrated view of the OeNB and serves to assess the consistency of the OeNB's intellectual capital with its knowledge-based strategic orientation.

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